

**ASSESSMENT OF PRINCIPALS' LEADERSHIP IN INFORMATION COMMUNICATION
TECHNOLOGY INTEGRATION IN PUBLIC SECONDARY SCHOOLS MANAGEMENT
IN BUNGOMA COUNTY, KENYA**

BY

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DECLARATION

DECLARATION BY THE CANDIDATE

This thesis is my original work and has not been presented for a degree in any other university.

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DEDICATION

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ABSTRACT

In this 21st century, there is global recognition of Information Communication Technology (ICT) as a tool for best management practices in various sectors. The Kenya government encourages ICT integration in school management through the National ICT policy and strategy and entered into partnership with development agencies and private organizations to promote ICT integration. Despite the efforts, progress has been short of expectation. In Kajiado County, 51% of teachers lacked Internet accessibility, 55% lacked administrative support for professional development in ICT while in Kakamega County, 61.9% of schools lacked ICT technical support and 57.1% had inadequately trained staff in ICT use. In Bungoma County, over 75% of Public Secondary Schools (PSS) have 1-10 computers while 25% have 11-40 and electricity. Even with these ICTs, principals' hardly integrated ICT in management tasks which raises questions on principals' leadership as key players in ICT integration in management activities. The purpose of this study was to assess principals' leadership in ICT integration in Public Secondary Schools Management (PSSM) in Bungoma County. Objectives were to: establish extent of ICT integration, determine factors influencing principals' leadership in ICT integration, assess principals' involvement of stakeholders in ICT integration, analyze the relationship between principals' technology leadership (PTL) and ICT use and assess impact of ICT integration on management. This study adopted Hasan (1998) Activity Theory in which whole work activity is broken into subject (person studied), tool (mediating device) and object (intended activity). Descriptive survey and co-relational research designs were employed. The study population consisted of 272 principals, 272 Deputy Principals (DPs), 272 Director of Studies (DOS) and 1088 Class Teachers (CTs). Saturated sampling technique was utilized to select 245 DPs while simple random sampling technique was utilized to select 82 principals, 123 DOS and 359 CTs. Data collection instruments were Interview Schedule and questionnaire for Principals. Observation Checklist and Document Analysis Guide were used alongside principals instruments, questionnaire for DPs, DOS and CTs. Validity was ascertained by revising the instruments based on feedback from experts in the School of Education, Maseno University. A pilot study was conducted among 27 principals, 27 DPs, 27 DOS and 11 CTs using test re-test method to establish reliability and yielded Cronbach alpha (α) reliabilities of .9 for principals, .74 for DPs, .93 for DOS and .73 for CTs, which were above .70 threshold and therefore acceptable. Qualitative data were categorized and reported verbatim while quantitative data were analyzed using percentages, means, linear regression and Chi-square to determine influence and relationship between principals' leadership and ICT integration. The great extent of ICT integration in DOS office with Average Mean Rating (AMR=3.65) while principals (AMR=2.76), CTs (AMR=2.55) and DPs (AMR=2.55) offices was somewhat integrated. Finance (62.2%), training (64.5%), administrative support (62.2%) and attitude (64.6%) influenced principals' leadership in ICT integration. Regression analysis indicated that by having an adjusted $R^2=0.854$ in DP's office, 0.9637 in DOS and 0.8237 in class management implied that 85%, 96% and 82% of variance in ICT integration respectively attributed to influence of selected factors. With Cohen's $f^2=2.91$ in DPs, 14.82 in DOS and 14.82 in class management implied large effect in respective offices. Principals mobilized stakeholders in ICT integration through PTA meetings (85.59%) and virement of School Funds (84.15%). The principals technology leadership was more pronounced in infrastructural changes than organizational and policy and culture changes. Integration of ICT had great impact on management as indicated by principals in an AMR=3.03 and DOS with AMR=3.19. The study may provide an impetus for formulating policies and strategies for principals' leadership in ICT integration in management.

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LIST OF ABBREVIATIONS AND ACRONYMS

AGM	:	Annual General Meeting
BOGs	:	Board of Governors
BOM	:	Board of Management
CDE	:	County Director Education
CDF	:	Constituency Development Fund
CDTSC	:	County Director Teachers Service Commission
CEMASTEIA	:	Centre for Mathematics, Science and Technology Education in Africa
CFSK	:	Computer for Schools Kenya
CTs	:	Class Teachers
DOS	:	Director of Studies
DPs	:	Deputy Principals
DSTV	:	Digital Satellite Television
EFA	:	Education for All
ESP	:	Economic Stimulus Programme
FSE	:	Free Secondary Education
HODs	:	Head of Departments
ICT	:	Information Communication Technology
INSETS	:	In-Service Trainings
KCSE	:	Kenya Certificate of Secondary Education
KEMI	:	Kenya Education Management Institute
KNBS	:	Kenya National Bureau of Statistics
KNEC	:	Kenya National Examinations Council
KRA	:	Kenya Revenue Authority
KREP	:	Kenya Rural Electrification Project
LCD	:	Liquid Crystal Display
MDG	:	Millennium Development Goals

MLR	:	Multiple Linear Regressions
MLRM	:	Multiple Linear Regression Model
MOE	:	Ministry of Education
MOEST	:	Ministry of Education Science and Technology
MP	:	Member of Parliament
MS	:	MicroSoft
NACOSTI	:	National Council of Science, Technology and Innovation
NCST	:	National Council of Science and Technology
NETSS	:	National Educational Technology Services Support
NGOs	:	Non- Governmental Organizations
PPP	:	Public Private Partnership
PSS	:	Public Secondary Schools
PSSM	:	Public Secondary School Management
PTA	:	Parent Teachers Association
PTAC	:	Parents Teachers Association Chairperson
PTL	:	Principals Technoloy Leadership
PTLA	:	Principals Technology Leadership Assessment
SCDE	:	Sub County Director Education
SD	:	Standard Deviation
SF	:	School Fund
SFM	:	School Financial Management
SIGA	:	School Income Generating Activities
SLR	:	Simple Linear Regression
SMASSE	:	Strengthening of Mathematics and Science in Secondary Education
SPSS	:	Statistical Package for Social Sciences
TL	:	Technology Leadership
TCO	:	Total Cost Ownership

TMCT	:	Tanzanian Ministry of Communications and Transport
TPAD	:	Teacher Performance Appraisal and Development
TSC	:	Teachers service Commission
TTU	:	Teachers' Technology Use
UNESCO	:	United Nations Educational, Scientific and Cultural Organization

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The development of Information Communication Technology (ICT) has come a long way with varying onsets from the global scene. Muriko, Njuguna and Njihia (2015 citing Carnoy, 2004) observed that computers were introduced in American schools in 1960s but faced with technicalities, were rejected until 1970s when there was acceptance and 1990s that made permanent seals. In Africa, Clark and Mayer (2003) indicated that computers made first appearance in schools in North Africa mainly for management dating back in the late 1960s. Three decades later, ICT integration in management in various sectors gained a rapid growth based on its power to transform environments in the information age. However, the Millenium Development Goals Report (MDG, 2010) sounds a cautionary observation that there exists great variability in ICT integration between developed and developing countries.

Afshari, Abu Bakar, Wong and Afshari (2010) conducted a study on principals' level of computer use and some contributing factors in secondary schools in Tehran, Iran. The study revealed that principals used ICT in management tasks variously where their level of computer use was explicit in Internet use (Mean =3.49; SD=0.79), hardware and software use (Mean =3.27; SD=0.66) and administrative use (mean=3.23; SD=0.90). A total of 47.8% of respondents observed that the Internet especially emails as indicated by 46.9% of respondents was used for communication and according to 33.8%, the web browser was used in exploring professional resources and 34.7% cited use on educational resources. Another 49.7% pointed out that hardware and software was basically for word processing in their professional assignments while a paltry 3.1% indicated that computers were used daily to construct databases, spreadsheet (2.5%) and powerpoint presentations (1.9%). Further on, it was noted that in administrative use,

computers were used mostly for communication within and without the school while financial matters, recordkeeping and professional development and analysis of problem solving were areas where computers were least used. It was concluded that principals rarely used computers in generating reports, collecting information for decision making in management, saving and retrieval of data which demonstrated that availability; accessibility and ICT literacy among principals was central to ICT integration in management functions.

The growth of the global economy and the information age society has pressured school principals to integrate ICT in management systems. As Miranaji and Lelei (2017) would argue, countries in Africa have since the recent past started exhibiting soundness required for education development which appreciates the need to integrate ICT in school administration. This would make practical sense by encouraging secondary school principals to absolutely integrate ICT in school administrative tasks. The integration of ICT comes across as a landmark for transforming based developing countries in knowledge societies.

In Ekiti State, Nigeria, Adeyemi and Olaleye (2010) study investigated the use of ICT for effective management of secondary schools for sustainable development. According to 51.7% of the respondents, computers were frequently used for typing, processing and storage of school management information, 49.4% observed that printers were occasionally used for printing school documents, 85.2% noted that Internet for browsing was not used and while 38.1% observed that photocopier machine was not used. They concluded that low level of ICT use was indicative that the government was not fully prepared to imbibe ICT equipment in PSS for effective management. The study recommended that Ekiti State government should purpose to demonstrate commitment in equipping secondary schools with essential ICTs through improved

funding of ICT equipment which would go along way to facilitate principals, teachers and other computer users seminars and workshops.

Abdelrahman (2015) sought to investigate the current status of ICT implementation in Khartoum State secondary schools, Sudan. The study identified various areas where ICTs were used and 83.3% of principals indicated that computers were used in writing documents and letters for schools, 54.1% used spreadsheets, 27% cited planning purposes, 23% used Internet and the email for communication while 27% indicated that Internet was used for search of information. It was concluded that low performance in ICT use in secondary schools was associated with lack or inadequate ICT infrastructure, lack of training and technical support which frustrated principals use in management. They recommended that the government policy should endeavour to address principals' ICT literacy built on the premise that principals have particular roles to play in ICT use in schools hence the need to understand the benefits across the school.

In Kenya, ICT integration is particularly becoming the main focus of education policy makers to transform management operations into a digitalized world. To establish factors influencing integration of ICT in management of PSS with functional ICT infrastructure in Kitui County, Kenya, Mutisya and Mwanja (2017) observed that according to 70% of principals, ICT was used to a great extent for internal exams, 56% cited on accounting and the same percentage were undecided on whether ICT was used or not while to a less extent subscale, 50% cited use on library services. Further on, 50% of senior teachers and assistant teachers opined that ICT was used for communication to a great extent similar to 52% and 66% citing timetabling and internal examinations respectively and 62% identifying with no extent in keeping teachers' records. While there was evidence of ICT integration as per the finding, integration varied in the subscales. Based on the findings, it was concluded that majority of principals used ICT in

management less frequently while Internet was rarely used and that some principals, senior teachers and assistant teachers had never used Internet. The study recommended that the government widens its supply of computers to all schools and make ICT integration in management compulsory. This would in turn encourage principals to acquire computers for integration in management.

In this technology driven age, institutions are pressured to catch up with the current technological trends and advancements which associate with Kenya Vision 2030 and the national ICT policy. Oyier, Odundo, Ganira and Kahiga (2015) carried out a study to establish effects of ICT integration on management of private secondary schools in Nairobi County, Kenya. The study found out that private secondary schools integrated ICT in financial management where 62.5% of schools automated their accounts, 71.9% in payroll and 53.1% in budgeting activities. In administrative activities, 68.75% of the stores were automated, 56.25% in administration of students' records while 62.50% in staff records. Similarly, integration of ICT was further observed in instructional management activities in which 53.10% had automated timetables, 84.30% in exams while 76.90% in students' progress reports. Further a field, ICT was highly integrated in schools with high enrolment and in day and boarding category which showed digital divide based on schools' economic status. In conclusion, ICT integration was described as valuable in storing and analyzing data in financial management processes such as budgeting, expenditure and students' fees payment. They recommended that the government should put policies in place to make ICTs affordable for schools hence adoption.

To address the effectiveness of integrating ICTs in secondary schools in Busia County, Kenya, Lipesa, Anyona and Kanga (2016) study sought to establish ways in which administrative staff integrated ICT in their functions. It was observed that the ways through which ICT was used in

processing examinations and maintenance of accurate students' records scored highly (Mean=3.93) which represented 78.6% of respondents. However, the frequency of ICT use in making school returns (45.8%) and retrieving stored information for decision making (57.2%) was generally low compared to other areas. Ways in which administrative teachers integrated ICT in their tasks was further interrogated and the findings illustrated the frequency of ICT use to process exams (Mean=4.41) and browsing the Internet for current information (Mean= 4.30) representing 88.2% and 86% respectively were highly scored while frequency of ICT use for seminars and workshop presentations was comparatively the least (Mean= 3.00) representing (60%). Based on the findings, they inferred that there was a glaring evidence between ways in which administrative teachers and assistant teachers integrated ICT in administration.

Today Bungoma county like any other part of the country is confronted with the fast growing demands of globalization and the technology driven world. In a study to establish teachers perceptions on the use of ICT in administration of PSS in ICT in Kimilili district, Bungoma County, Kenya, Wanjala, Odhiambo and Ngumbi (2013) asserted that 61.4% of PSS used ICTs for registration and confirmation of students for national exams, 52.1% used in preparation of students' report forms, 50.7% engaged in preparation of professional records such as schemes of work and lesson plans while a paltry 7.8% were applied in the maintenance of teachers attendance records. The high responses on ICT for registration and confirmation was associated with adherence to the Kenya National Council of Examination policy (KNEC, 2012) that requires online exercise. The study concluded that although PSS used ICT in daily administrative tasks, its use was rated as below average although both national and county PSS had computerized more of their administrative functions than sub county schools. They recommended that the government should facilitate both material and human resource base in

schools to enhance application of ICT into administrative tasks which could be done through Teachers Service Commission (TSC) by deploying computer teachers and ICT experts or technicians to provide technical support.

Afshari *et al* (2010) study sought to establish principals level of computer use and some contributing factors, Adeyemi and Olaleye (2015) study focused on ICT effectiveness on school management in PSS, Abdelhram (2015) investigated the current status of implementation of ICT in State secondary schools, Mutysia and Mwanja (2017) study established the extent of ICT integration in management of PSS with focus on schools with functional ICT infrastructure, Oyier *et al* (2015) study established effects of ICT integration on management of private secondary schools, Lipesa, Anyona and Kanga study focused on effectiveness of ICT in enabling E- leadership in PSS while Wanjala, Odhiambo and Ngumbi (2015) study sought to establish teachers' perceptions on the use of ICT in administration of PSS. None of these studies sought to establish the extent of ICT integration in PSSM, a gap that the current study attempted to fill.

The integration of ICT is rapidly forming an important activity of a school life. The United Nations Educational, Scientific and Cultural Organizations (UNESCO, 2011 citing Kozma, *et al*, 2004) indicated that schools in developing countries are prone to more barriers in ICT use than developed. For instance, barriers in schools in South America and Africa included inaccessibility to functional computers and Internet, lack of software, technical and administrative support, inadequate teacher training and intermittent distribution of electricity supply. Similarly, UNESCO (2014) indicated that electricity is a major obstacle to ICT integration in education in India and several underdeveloped countries namely Nepal and Cambodia where only 24% and 7% of secondary schools respectively had electricity unlike Malaysia and Armenia where all schools had electricity. Integration of ICT is dependent upon principals' leadership to provide or

receive administrative support for teacher professional development and resource acquisition to realize Total Cost Ownership (TCO). Miranji and Lelei (2017) argue that in line with utilitarian values of ICT in schools, its common knowledge that principals take a central role to spin realization and sustainability of ICT usage. Conversely, they observe that principals were short of performing their roles due to the challenges that come with ICTs.

In Nayef and Menchaca (2014) study on barriers in utilizing ICT in education in Jordan lack of confidence among teachers was associated with fear of social embarrassment during ICT use borders lack of knowledge and skills in ICT. There was also the issue of resistance to change given that teachers were basically introducing a new approach to management activities. Resistance is sometimes attitudinal on what the new phenomenon would do hence the belief in status quo. In the same breath, it was observed that the Jordian government experienced financial difficulties to provide schools with sufficient number of computers, interconnectivity, accessibility or technical staff. This then attracts the understanding that inaccessibility to ICT resources and infrastructure was well identified as inhibiting factor towards ICT integration. The study concluded that barriers to ICT were common, expected and in some incidences teachers were bound to fail. That the MOE was not appropriately engaged in the process of ICT integration in terms of supporting schools hence the desperate state of affairs. They recommended that although the MOE could be faced with financial difficulties in a difficult global economy, it should assist in offering occasions in sharing best practices and training to teachers.

In the wake of technology revolution in the 21st century, ICT has great potential in supporting and uplifting management standards regarding service delivery. However, certain factors influence the integration of ICT in management processes which are described in the context of

developed or developing countries and not limited to schools of the later nations. In an investigative study of ICT integration in Lesotho secondary and high school science classroom, Kalanda and De Villiers (2012) findings revealed that 90% of the responses cited lack of, or limited professional development programs, 71% observed that there was insufficient class time allocated to ICT activities while 67% cited infrastructural and technical problems in schools as barriers to integration. Apparently teachers professional development programs were the main undoing regarding ICT integration hence impacting negatively on their self efficacy. Based on the findings, it was deduced that Lesotho secondary schools were making progress in ICT integration however there were great concerns in rural areas on teacher professional development which was wanting. It was recommended that the government should up their game in creating a level ground in facilitating capacity building teachers.

Information Communication Technology has become an integral component in both formal and informal sector in the global life cycle as a contemporary mode of bringing about rapid changes to shape the economy. In discussing barriers on the implementation of ICT in PSS in Sudan with focus on teachers' perspective, Abdelwahed (2016) study identified various factors as barriers. In the findings, 85% of the respondents opined that there was insufficient computer labs, 80% cited lack of teacher training in ICT use and lack of ICT resources, 75% experienced difficulty in ICT integration and also lacked time to integrate, 74.5% pointed out low internet connectivity, 72.5% cited inadequate technical support while 62.5% cited inadequate computer maintenance as major barriers to ICT implementation. It was concluded that even with the MOE initiative to formulate ICT policy and provide resources, several barriers as indicated hindered ICT implementation in PSS. The study recommended that MOE should prioritize teacher training in ICT for effective

implementation, that principals and teachers should support each other through hands-on kind of training to enhance knowledge and skills.

The National Council of Science and Technology (NCST, 2010) described computer use in Kenyan schools as still at infancy and concluded that administrators and teachers perceptions and experiences play a significant role in use. This was supported by Nyanchoka, Matula and Kalai (2015 citing Kelles, 2005) that whereas other countries reported over 40% successful ICT integration in administration, Kenya's performance was below par. Momanyi (2011 cited in Komen, Too & Kerei, 2013) asserted that yes, ICT had outperformed all other segments in the Kenyan economy, growing by over 20% annually over a decade which was certainly slow growth. This brings to the fore the issues bedeviling fast growth in integration of ICT that need to be interrogated.

According to Sessional Paper No. 1 of 2005 on policy framework for education, training and research (MOES&T, 2005) and MOE (2006), 75% of PSS in Kenya relied on alternative sources of power from grid lines or generators which introduced the financial factor as determining the source of power. A principals' leadership is a major component of school administration on whom everyone hangs on their ability, knowledge and skills and professional competence to determine effectiveness in ICT integration.

Muriko, Njuguna and Njihia (2015) carried out a study to establish factors affecting utilization of ICT in PSS administration in Kiambu County, Kenya. They contend that according to 91.6% of principals, lack of finances to purchase ICT facilities, 50% cited high maintenance costs and insecurity or loss of ICTs to thieves, 25% cited lack of qualified personnel as major factors affecting utilization of ICT in PSS in administration. From the findings it was concluded that there was inadequacy of computers in most schools due to financial constraints and the few that had were mostly in principals' offices or computer room which denied teachers accessibility.

They recommended that MOE increases budgetary allocation to free parents from the burden of contributing towards ICT project. The huge percentage identifying lack of funds signified little progress in the integration given that ICT requires funds to ensure TCO.

In a study to establish principals' integration of ICT in administration of PSS in Isinya Sub County, Kajiado County, Kenya, Nyanhoka, Matula and Kalai (2015) established that 75% of respondents cited principals' positive attitude and 65% of principals' offices had available Internet connectivity in PSS in Isinya sub county. Availability of Internet connectivity provided an opportunity for principals to be in touch with the outside world. The findings portrayed a picture that principals' attitude had great influence and that there was a lapse in hiring of qualified technicians where 60% relied on computer teachers as opposed to 40% with technicians. The study recommended that schools should consider making local Internet available to all teachers to enhance accessibility and use among all school sub systems.

Mereringa and Koringura (2013) carried out a study to establish the effect of computers in management of secondary schools, West Pokot county Kenya. According to 70.5% of the respondents, computers were inadequate while 62.7% indicated that there was also inadequate software or programs for data capture and storage for staff to integrate in management. This means that teachers were unable to access computers whenever they wanted to use, factors which were extrinsic rather than intrinsic. In conclusion, it was observed that inadequacy of computers and software programs in secondary schools limited access to computers to integrate in management. The study recommended that the government in partnership with other stakeholders should work towards ensuring that all schools have access to computers to aid in school management services. The principals leadership should stand out as a key pillar and demonstrate responsibility for positive productivity.

Various thoughts and narratives have been associated with failure to integrate ICT in PSSM. Kukali (2013) sought to establish opportunities and challenges faced in integration of ICT in PSSM in Bungoma South District, Bungoma County, Kenya. The findings revealed that an emphatic 100% of principals cited lack of funds, training and ICT infrastructure while 93.8% cited lack of technical support and 68.8% pointed out at administrative support as challenges faced in ICT integration. The study concluded that there was great digital divide regarding ICT integration in PSSM due to causal factors such as lack of funds, training, technical support and administrative support. A recommendation for the MOE to increase its budgetary allocation to schools would help facilitate acquisition of ICTs, for capacity building and in general TCO in integration of ICT. As Rono (2011) would argue, most schools in Kenya did not support teachers in their endeavors to use computers in performing tasks, which mirror the inadequate support teachers received with regard to ICT integration.

Nayef and Menchaca (2014) study was on barriers in utilizing ICT in Education, Kalanda and De Viliers (2012) study investigated ICT integration in Lesotho secondary and high school science classroom, Abdelwahed (2016) study focused on barriers on implementation of ICT in PSS in Sudan with focus on teachers' perspective, Muriko, Njuguna and Njihia (2015) study sought to establish factors affecting utilization of ICT in PSS administration, Nyanchoka, Matula and Kalai(2015) study focused on principals' integration of ICT in administration of PSS, Mereringa and Koringura (2013) carried out a study to establish the effect of computers in management of secondary schools while Kukali (2013) sought to establish opportunities and challenges in ICT use and integration in PSSM. None of these studies sought to determine factors influencing principals' leadership in ICT integration in PSSM, a gap that the present study attempted to fill

The importance of ICT integration was globally recognized through various body efforts. The Dakar Framework for Action World Education Forum (2002) identified use of ICT as one of the main strategies for achieving Education For All (EFA) policy which motivated governments to formulate policies to provide for ICT integration. According to Tanzanian Ministry of Communication and Transport (TMCT, 2003), the government formulated a National ICT Policy to intensify national economic growth and social progress in all sectors. One strategy encouraged partnerships between stakeholders and education sector to help ameliorate challenges while a policy statement highlighted the need to encourage Public Private Partnership (PPP) to explore funding options.

The advancement of ICT penetrated education and administrative tasks apportioned more weight due to the ever increasing valuable roles ICT plays as a tool of choice in the digital age. In the backdrop of this narrative, Kenya promulgated its National ICT Policy (MOE, 2006) which sought to make services to Kenyans better by ensuring accessibility, affordability and reliability of ICT services as indicated in the “ICT in Education Options Paper” (MOES&T, 2005). Similarly, the aim was to guide the education sector adopt ICT at all levels of education and training as captured in the strategies outlined in “National ICT Strategy for Education and Training” (MOE, 2006) where one strategy encouraged Public Private Partnership (PPP) for resource mobilization. However, to roll out ICT implementation as espoused in various documents was capital-intensive which set stage for inclusion of stakeholders to support a meaningful course. Conversely, while the national ICT policy encourages ICT integration in education systems, only 4% had been realized mostly in urban centres hence the conversation on ICT uptake geared towards stakeholder involvement. The government created initiatives to help schools acquire ICTs to bridge the digital divide through grants to schools and collaboration with

development partners like donors, Non Governmental Organizations (NGOs) and private companies to alleviate ICT challenges (Republic of Kenya, 2011).

Principals employ various ways in acquisition of ICTs in their schools. Katulo (2009) investigative study sought to establish the role of principals in promoting computer usage in selected Namibian schools. The findings revealed that selected schools received computers from different sources such as School net which is an MOE program, MOE development program, Chinese Embassy in Namibia and School Fund (SF) in which the latter was set aside purposely to cater for ICTs. Besides, the School net program and the National Educational Technology Service and Support Centre (NETSS) provided technical support in maintenance of school computers which enabled principals save on costs for hiring of a technician. Principals' are strategic leaders who play a prominent role in school management and planning. Principals involvement of stakeholders in support of computers employed writing requisition letters to such bodies seeking for donations. The study concluded that principals' good leadership is a critical factor in development of ICT especially if ICT users are encouraged to use acquired ICTs.

Studies have illustrated that technology is expensive and any form of support would save the situation. Muriithi and Zengele (2015) conducted a study on the management challenges of using ICT for administration at secondary schools in Kirinyaga county, Kenya. In addressing involvement of key stakeholders in national ICT policy formulation, they asserted that funding agencies were involved as illustrated in a (Mean=2.82; SD=1.237), developing organizational partners (Mean=2.76; SD= 1.393) and administrators (Mean=2.76; SD=1.251). The findings depict the government minimal involvement of key stakeholders in national policy formulation. They recommended that government through MOE should involve key stakeholders in policy

formulations from initial stages to ensure smooth transition in integration in school administration.

To integrate ICT in school management tasks requires a colossal amount of funds for TCO. The process would therefore borrow from government strategies to involve stakeholders as a pathway to obtaining maximum returns. Muhinji, Gichui and Riechi (2013) conducted a study on factors influencing financing of ICT use in PSS in Busia District, Kenya. They found that 80% of respondents disagreed that there was adequate government funding on ICT in schools, 60% disagreed that government adequately funded teacher training on ICT, computer facilities and Internet connectivity. This was a demonstration that although inadequate but the government funded ICT in one way or another. For instance, major funding agencies were the government and Parents Teachers Association (PTA) followed closely by individual personalities and donors respectively. On the part of teacher training, the study found that teachers individually sponsored themselves for ICT training and at a minimal level schools. For this reason, 65.71% of teachers had not undertaken an in-service course in ICT. However, schools, government and NGOs in a descending order also chipped in to support teachers for ICT training. In conclusion, there was an acute shortage of computers in schools and lack of trained computer teachers. The partners and government were not doing enough to support ICT use in PSS. The study recommended that government should mount a deliberate expenditure on ICT facilities in all schools to ensure uniformity of resources and TSC arm should staff ICT savvy teachers to schools to seal the gap on resource underutilization.

Musambai, Ndirangu and Mukhwana (2017) undertook an investigative study on influence of ICT on quality of educational management in secondary schools which received MOE grants on ICT in Kakamega County, Kenya. The findings illustrated that according to 86% of principals

and 75% of HODs, relevant stakeholders were involved in financing ICT infrastructure besides, conducted fundraising as observed by 76% of principals and 85% of HODs to improve ICT use based on challenges. It was concluded that although schools had ICTs such as laptops, desktop computers and Internet obtained courtesy of the Economic Stimulus Program, (ESP), school managed to acquire other ICTs through donation and SF.

While Katulo (2009) case study investigated the role of principals in promoting computer usage in selected Namibian schools, Muriithi and Zengele (2015) conducted a study on management challenges of using ICT for administration at secondary schools, Muhinji, Gichui and Riechi (2013) sought to establish factors influencing financing ICT use in PSS and Musambai, Ndirangu and Mukhwana (2017) undertook a study to determine the influence of ICT on quality of educational management in secondary schools which received MOE grants on ICT. None of these studies assessed principals' involvement of stakeholders in ICT integration, which the current study sought to do.

The concept of successful ICT integration in management would be quasi fulfilled without holding a conversation on technology leadership practices. The need for multiple dimensions to provide a road map for technology leadership (TL) for principals to enhance important roles of embracing inclusivity are paramount. A literate technology leader provides muscle to teachers' technology literacy which ultimately encourages integration with self efficacy. As Berret, Murphy and Sullivan (2012) would argue, principals' support and understanding of technology integration plays a significant role in schools. They argued that the success of ICT integration depends on Principals' Technology Leadership (PTL) support to regularly review infrastructural, organizational and policy and culture changes relevant to current trends.

Tan (2010) in review of empirical studies on TL and lessons learnt from empirical research in secondary schools in Singapore, observed that school technology leadership is a potential factor that affects quality of ICT integration. He further argued that even with several relationships between TL and level of Technology Use (TU) in schools; the field was reportedly under-explored even when Singapore as a developed nation was cognizant of technology and TL unlike developing countries. Four areas of TL were outlined namely: infrastructural change, organizational and policy change, pedagogy and learning change and culture change to ensure effective ICT integration. Tan (2010) concluded that the school TL was a strong predictor of the level of TU while transformational leadership was correlated with principals' ICT competencies.

Since the introduction of ICT integration, principals emerge unprepared from various fields to claim their new role of technology leadership titles. Due to unpreparedness, they find themselves struggling to initiate essential changes for achievement of meaningful ICT integration outcome. Arumugam, Yahya and Abdi (2014) conducted a study on the relationship between PTL and Teachers' Technology Use (TTU) in PSS in Kedah, Malaysia. The relationships between Principals' Technology Leadership Assessment (PTLA) and TTU measured using Simple Linear Regression (SLR) analysis and the study revealed that PTLA was not a good predictor of school technology use. The regression equation had $\beta = -0.825$ for TTU and $\beta = 0.037$ for PTLA, established that one unit of change in PTLA score could lead to an increase by approximately $|\beta| = 0.04$ while a unit change in PTLA would trigger a positive change of $|\beta| = 0.8$, hence PTLA was identified as important in successful implementation. The Malaysian MOE consider principals as key players in technology policy implementation. However, diverse dimensions like infrastructural, organizational and policy and culture changes essential for ICT integration were unknown to many principals. Although TL areas are solid for integration the informal TL have

focused on acquisition of hardware and software without considerable focus on organizational and culture changes central to integration.

The roll out of technology and associated resources in schools is not an obvious indicator of improvement. Amory (2015 cited in Meyer & Gent, 2016) while discussing the status of ICT in education in South Africa asserted that TL and organizational culture are pillars to an effective ICT implementation plan. The TCO approaches when budgeting for ICT programs are critically considered so as to consequently deal with the hidden and long term costs associated with donated technology. The use of technology literacy programs supports the development of technical skills that are most elusive among teachers. School related policies such as ICT written plan, ICT support and training have a significant effect on ICT use and provides solution to the aspect of technical skill deficit. In the absence of an understanding of how hardware choices and deployment scenarios impact on ICT integration, principals mostly relied on ICT technicians. Consequently ICTs are locked up in restriction of access due to lack of ICT code of conduct. The TL in conclusion was described as the single most important factor for determining whether integration is successful or not.

According to Mwawasi (2014) case study on TL and ICT use in PSS in Kenya, TL is a fairly new concept in school leadership focus. The study revealed that, TL was committed to equal distribution of ICT infrastructure through school ICT planning and development teams. In the case of schools' ICT equipment acquisition, TL sponsored teachers for training in ICT use and further hired ICT experts to induct teachers. It was noted that organizational and policy and culture changes were manifested in involvement of ICT committee for budgeting of ICTs, teambuilding, boost accessibility and equitable utilization of ICT infrastructure. This files the PTL as an indirect team player with priorities based on member expertise and priority areas.

In establishing factors affecting utilization of ICT in administration of PSS in Kiambu County, Kenya, Muriko, Njuguna and Njihia (2015) study revealed that 58% did not have a written ICT plan while 42% had. This demonstrated that most PTL were integrating ICT in administration without any stipulated guidelines under the principle of organizational and policy change translating into unprocedural acquisition of computers that was likely to stifle use. On availability of school websites, 67% of the respondents posited that schools had no websites while 33% cited availability. In the absence of websites, communication with stakeholders would be limited because of its ability as a communication tool that carries information such as history of the school, contacts and serves as an online brochure for potential parents and students.

Tan (2010) reviewed empirical studies on TL and lessons learnt from empirical research in secondary schools, Arumugam, Yahya and Abdi (2014) conducted a study on the relationship between PTL and TTU in PSS, Amory (2015 cited in Meyer & Gent, 2016) discussed the status of ICT in education, Mwawasi (2014) case study on TL and ICT use in PSS, Muriko, Njuguna and Njihia (2014) study sought to establish factors affecting utilization of ICT in administration of PSS while the current study sought to analyze the relationship between PTL and ICT use in PSSM with focus on infrastructural, organizational and policy and culture changes in PSSM.

In exploring the role of technology in education management in South Africa and way forward, Meyer and Gent (2016) indicated that ICT plays a transactional role in support of the operation of education system and aims at enabling education system to function effectively. They found ICT use as having a way and means of recognizing and defining best practices and had benefits to the school leadership and management to reflect on whether school activities were taking place at appropriate places in the system. The study concluded that ICT integration would be successful when teacher professional development programs, ICT competence, ICT vision and

policy were in place in schools practicing integration and vice versa. This implied that organizational and policy changes were missing out to complete the description of a PTL.

In a case study to establish utilization of computers in management of secondary schools in West Pokot County, Kenya, Merirenga and Koringura (2013) revealed that use of computers in administrative tasks made work easier for principals and teachers. There was 77.3% of respondents who observed that students' records were safely stored and there was quality documentation while 100% stated that computer generated data improved efficiency in performance of school administration. It was concluded that ICT use had great impact on the work performance for both principals and teachers in management tasks and recommended that government supports schools on acquisition of ICTs.

Manduku, Kosgey and Sang (2012) carried out a survey on adoption and use of ICT in enhancing management in PSS in Kesses zone, Wareng Sub County, Uasin Gishu County, Kenya. They pointed out that ICT use in management improved effectiveness and efficiency, decision making, communication, record keeping, cost effectiveness and also made work easier. It was concluded that in spite of the benefits associated with ICT adoption and use, management was yet to fully realize full potential of ICT adoption and use in performing management tasks due to challenges experienced.

In their study on effects of ICT application on strategic educational quality standards management in Bungoma County, Kenya, Oguta, Egessa and Musiega (2014) study findings depict that ICT enhanced day-to-day management and improved efficiency consequently coping up with rapidly changing world in performing management operations. The 59.4% of respondents observed that application of ICT in examinations led to an improvement in

performance and not in management. They concluded that ICT use had positive impact on strategic educational quality standards management and was a tool for competitive advantage although applications were basically for word processing. They recommended that government makes a policy for all PSS to acquire and use ICT in management tasks and all principals and deputy principals should be capacity built to enhance self efficacy in ICT use.

Meyer and Gent (2016) explored the role of technology in education management and way forward, Merirenga and Koringura (2013) case study sought to establish utilization of computers in management of secondary schools, Manduku, Kosgey and Sang (2012) survey was on adoption and use of ICT in enhancing management in PSS, Oguta, Egessa and Musiega (2014) study was on effects of ICT application on strategic educational quality standards management. None of these studies assessed the impact of principals' leadership in ICT integration on PSSM, a gap that the present study attempted address.

Majority of PSS in Bungoma County had between 1-40 computers (CDE Office, 2015) and some with functional Internet connectivity yet there was minimal ICT integration in PSSM tasks. Besides, various factors identified as influencing principals' leadership in ICT integration, studies did not adequately address principals' involvement of stakeholders in ICT integration. From the background most studies did not address PTL as core area for successful ICT integration invoking thinking about the concept in Bungoma County. This raised questions to interrogate principals leadership. It is against this background that this study sought to assess principals' leadership in ICT integration in PSSM in Bungoma County, Kenya.

1.2 Statement of the Problem

In this information age, Kenya as a country has been working towards global competitiveness regarding ICT integration in education sector. This has been guided by emerging global technological trends and government policies to embrace ICT integration in management for best service delivery. In other countries, ICT integration in management has scored 41% while in Kenya the magnitude remains substantially below par even with government high investment. For instance, for the last decade only 20% progress had been reported depicting slow progress. Bungoma County as one of the largest Counties in Kenya is well endowed with computers ranging between 1-10 (75%) and electricity,11-40 (25%) and other ICT infrastructures. Nonetheless, not all schools utilized available ICTs like computers while in other schools they are not available. Principals in PSS across the country are under pressure to integrate ICT in management tasks and Bungoma County is not an exception. Despite the demands, principals in Bungoma County are underperforming in areas not guided by government policy which invokes thinking to establish whether its principals leadership or not. For instance, availability of ICTs or access do not necessarily translate into integration as other factors are construed as below par. In the national ICT policy document, one of the strategies to improve ICT integration is to enter into partnership with stakeholders and Public Private Partnership (PPP) to provide for ICT necessities. Although, principals' involvement of stakeholders was evidenced in some schools, the kind of partnership support was inadequate and more often than not donors have found schools as places for e-waste management disposal. Most donated ICTs are incompatible with the contemporary software. The onset of ICT integration in management activities has had a bearing on principals' roles and ways of managing schools to enhance productivity, effectiveness and efficiency in service delivery. This guides principals into technology leadership to change school infrastructures, organizational and policy and cultural changes. However, most principals

come unprepared as technology leaders to institute ICT integration without prior knowledge and skills of a technology leader. Principals live the assumption that ICT integration is mere acquisition of computers hence end up struggling to put necessary changes in place. While there are efforts to innovate or renovate ICT infrastructure, minimal or no evidence of organizational and policy and culture change in practice as aspects of TL was noted. This raises questions on PTL in ICT integration in PSSM. The knowledge gap on the importance of TL necessitated a study to analyze relationships between PTL and ICT use in PSSM. Whereas it is appreciated that technology simplifies management operations for principals as evidenced in other sub counties, integration of ICT in PSSM in Bungoma County has recorded minimal impact especially in non government policy guided areas.

1.3 Purpose of the Study

The purpose of this study was to assess principals' leadership in ICT integration in Public Secondary Schools Management in Bungoma County, Kenya.

1.4 Objectives of the Study

Objectives of the study were to:

1. Establish extent of ICT integration in Public Secondary Schools Management
2. Determine factors influencing principals' leadership in ICT integration in Public Secondary Schools Management
3. Assess principals' involvement of stakeholders' in ICT integration in Public Secondary Schools Management
4. Analyze the relationship between principals' technology leadership and ICT use in Public Secondary Schools Management

5. Assess the impact of ICT integration on Public Secondary Schools Management.

1.5 Research Questions

The study was guided by the following research questions:

1. To what extent is ICT integrated in Public Secondary Schools Management?
2. What factors influence principals' leadership in ICT integration in Public Secondary Schools Management?
3. How do principals' involve stakeholders in ICT integration in Public Secondary Schools Management?
4. What is the relationship between principals' technology leadership and use of ICT in Public Secondary Schools Management?
5. What is the impact of ICT integration on Public Secondary Schools Management?

1.6 Significance of the Study

This study would benefit principals in integrating ICT in management as a precursor for best management practices. The findings have both theoretical and practical implications for principals' leadership in ICT integration now and for prosperity. Theoretically, principals and teachers would be motivated to rethink professional development in ICT integration so as to favorably compete on the global scene. On the practical aspect, findings on factors influencing principals' leadership and impact of principals' leadership in ICT integration would motivate the MOE, policy makers and other stakeholders to prioritize TCO for effective and efficient ICT integration. Consequently, TCO would minimize the current digital divide in ICT hardware and software availability, accessibility and maintenance issues experienced. The findings would be significant in highlighting PTL that is central in ICT integration in school management and related areas. The study presents a framework for analysing principals' roles in technology

leadership in ICT integration in PSSM which would outline core competencies, personal attributes and role responsibilities. The study findings would serve as a starting point for developing the future model for principals' technology leadership in ICT integration in PSSM. In this section, four role responsibilities which were found to be related to achievement of ICT integration were; infrastructural changes, organizational and policy changes and culture changes. The study would be significant to policy makers and MOE in formulating policies to advance ICT integration in PSSM geared towards global competitiveness. The study would serve as reference material to potential researchers in related area.

1.7 Assumptions of the Study

The study was based on the following assumptions:

1. Principals with ICT based knowledge and skills are sensitive to integrating ICT in management while those limited in the same are not expected to utilize ICT tools for which they have no training in as this would impact on their self efficacy and competence for meaningful outcome.
2. Principals' leadership in ICT integration in management improved management practices to promote effectiveness and efficiency in service delivery.

1.8 Scope of the Study

The study focused on principals' leadership in ICT integration in PSSM in Bungoma County, Kenya. Respondents consisted of principals, DPs, DOS and CTs. Confining in PSS implied findings could only be generalized to PSS as they were thought to be experiencing related issues and not shared with private schools in Bungoma County and outside as justified by Oyier *et al*, (2015) study.

1.9 Limitations of the Study

The study area was Bungoma County and the study findings should not translate into blanket generalization to all public and private secondary schools given the digital divide. Some respondents failed to fill questionnaires which reduced the return rate to less than 100%. The methodological weakness such as use of self-administered questionnaire was a limitation as the subjective component of such data was undeniable. To this end, triangulation approach was used to minimize the effect of subjectivity.

1.10 Theoretical Framework

This study adopted activity theory by Hasan (1998) which states that a whole work activity is the unit of analysis where the activity is broken into analytical components namely subject, tool and object. He describes the subject as the person being studied, the object being the intended activity and the tool as the mediating device by which the action is done. Hasan went ahead to argue that an activity is two fold as it mediates and is mediated by physical and psychological tools used and the social context in which the activity is performed. That the capability and availability of the tools mediates the activity, in turn such tools paint a picture of a historical knowledge of how a particular society works and is organized. Tools in the activity, categorized as primary which are described as obvious ones used while secondary consist of plans and know-how of the tool user while tertiary tools include the relationship between the tool user and provider which spills over time due to circumstances like resistance or conflicting requirements to change, regulations and conducts governing change.

Activity theory was found relevant to this study because the study revolves around three analytical components namely the principals' leadership in ICT integration (Subject), the integration of ICT in PSSM being the intended activity (object) and the ICTs as mediating device

(tool) by which action of integration is performed. Participants in ICT integration being principals, DPs, DOS and CTs, the purpose is to enhance service delivery. The principals' leadership is required to provide ICTs as tools to mediate integration in management functions in their offices, DPs, DOS and CTs. The initiative is to align with global technological trends and principals are in the process of rapid, constant yet gradual change in TL.

This study adopted activity theory because of its role in providing clear understanding of daily interactions among principals, DPs, DOS and CTs regarding ICT integration. Interactions are however guided by principals' leadership and like any organization; contradictions are common place given the newness of ICT integration concept. Contradictions are however healthy in an activity as they lay ground to understand breakdown in relationships. It's for this reason that an analysis of contradictions should be carried out to establish factors influencing ICT integration and consequently invoke activity theory to realize success.

Therefore activity theory perceives ICT integration as mediation tools incorporated in the system, a system created and transformed by people (principals). In the process of developing the activity, it is natural that remnants of culture and historical pieces are carried forward in the new activity order. The implication is that mediation through ICT tools is not independent *per se* but that tools (ICT) have an influence on the interaction between the subject (Principals) and the object (integration of ICT). The whole activity process is guided by rules supposedly engrained in ICT code of conduct aspect of the organizational and policy change component.

Activity theory was found relevant to this study because principals' leadership was the subject under study. Principals in their leadership have an intended objective that of integrating ICT in management arguably made possible with availability and accessibility of ICTs. The PTL

required changes in infrastructural, organizational and policy and culture changes despite cost implications involved. To make ends meet, principals' leadership should be creative and innovative enough to rethink involvement of stakeholders to support the process. Adequacy, accessibility and skills to integrate ICT in management provide an impact that enhances service delivery based on global competitiveness.

1.11 Definition of key operational terms

The following terms were defined as used in this study:

Assessment	This refers to the process of gathering information about ICT integration in management using different methods and processing the information to make decisions about effectiveness
ICT	This is a hardware or a software that enable data acquisition, processing, storage, retrieval and delivery
ICT integration	In the current study it means installation of capacity in terms of electronic resource management
Impact	This is a positive or negative effect as a result of integration of ICT
Management	Refers to functions undertaken by the principal by working through HODs and using resources to achieve institutional goals or objectives
Principals' Leadership	This is the principals' ability to lead staff by organizing, delegating and spearheading independence of subsystems to collectively embrace ICT integration

Public Secondary Schools Management	Is the control and support of school activities by government appointed staff to oversee smooth running of the school
Stakeholders	These are people, private or public organizations with interest or influenced by principals' leadership to be involved in ICT integration
Total Cost Ownership	This is an analysis intended to uncover all ICT equipment costs from budget planning, purchase, usability, maintenance and hiring of qualified technician before integrating ICT
Technology Leadership	Refers to infrastructural, organizational and policy and culture changes put in place to facilitate ICT integration in management.
Workshop level	This is a kind of training that covers a period of a day to a week

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed related literature on extent of ICT integration in management, factors influencing principals' leadership in ICT integration, principals' involvement of stakeholders in ICT integration, PTL in ICT use and impact of principals' leadership in ICT integration.

2.2 Extent of ICT Integration in Management

The increasing competition among organizations to catch up with the technological trends has led to the search of more contemporary and effective management processes. Globally the level of ICT use in education institutions varies from country to country. According Al harbi (2014 cited in Al Mofarreh, 2016), ICT has literally become a requirement of choice for participation in society and workplace. Employees are incidently expected to be ICT savvy to fully engage in any activities and services which are available online. The contemporary global technological advancement pacing towards educational institutions and in school management tasks are shaping the effectiveness and efficiency of school leadership in management and administrative functions. Riddle and Song (2012) observed that the adoption of technology could be understood to mean the reallocation of decision made to respond to change that is beneficial in terms of productivity and performance. As Adeyemi and Olaleye (2010) would argue, school administrative functions were increasingly becoming complex and needed powerful tools to bring better communication and efficiency.

Afshari, *et al* (2010) conducted a study on principals level of computer use and some contributing factors in Tehran, Iran. The findings revealed that principals' ICT use was average with a mean of 3.49 using Internet, 3.27 using hardware and software, 47.8% used Internet and 46.9% email for communication at school. Well over 75% used a web browser generally, 33.8%

and 34.7% used for professional and educational material respectively. Besides Internet, 49.7% used hardware and software on daily word processing for individual professional work. The study concluded that principals spent less time on the computer which were rarely used to generate report cards, collect information for management decision and saving and retrieving data. It was recommended that principals work on literacy skills in ICT and an evaluation study should be carried out on extent to which secondary school principals use computers in school administrative tasks.

In a case study to explore the role of school principals in promoting and managing usage of computer in selected schools in Caprivi region, Namibia, Katulo (2009) asserted that spreadsheet programs like Microsoft Excel and Open Office Calc Software were used for recording students' test scores while database managers like Microsoft Access and Open Office Base recorded students' grades and guardian's names. It was further established that Open Office Base analyzed performance for individualized programs while preparation of timetables, class tests and entering of examination marks involved the computers. The study recommended that principals should adopt strategies that make ICT a daily usage for teachers by asking teachers to submit their daily preparations electronically once Internet was in place. This means Class Teachers(CTs) or subject teachers integrated ICT in students' management records than any other management task.

A school principal plays a vital role in integration of ICT in school management by addressing the concerns. Musau, Mulwa and Matemu (2016) carried out a study on integration of ICT in PSS administration in Kibwezi sub county, Makueni County, Kenya. The study revealed that according to 52.9% of principals, 68.0% of Head of Departments (HODs) and 72.1% of CTs, schools had no Internet connectivity. The situation would impede online operations such as email

sending and receiving, website postings and Internet search for any professional material. On frequency of ICT use, 35.4% of principals indicated that they never used the Internet to find information on administration, 41.2% never used for processing and analyzing administration data and 52.9% never used to communicate with teachers on any information. Conversely, 50% opined that computers were mainly used by the secretary to type school material. It was concluded that schools had inadequate computers and lack of Internet connectivity hence minimal level of ICT use in administration. The study recommended that the government should support schools financially to facilitate acquisition of essential ICT in administration.

For principals to effectively and confidently use ICT in school administrative tasks, they need adequate training on use of ICT alongside access to ICTs. Chepkonga, Kimani and Okoth (2015) carried out a study to establish the determinants of principals level of integration of ICT in management of PSS in Nairobi county, Kenya. They asserted that extent of using ICT in school administration (51.5%), guidance and counseling(70.8%) and managing resources (54.5%) and financial management (50%) were rated as moderate respectively. Similarly, 50% rated financial management as moderate while on overall, 59.1% rated level of principals use of ICT as moderate. The study concluded that some secondary schools had not integrated ICT for lack of resources and electricity and therefore recommended to the MOE to lay out ICT infrastructure in schools in order to enable use in management.

In investigating the use of ICTs on the quality of educational management in PSS in Kakamega County, Kenya, Musambai, Ndirangu and Mukhwana (2017) observed that 61.9% of respondents strongly agreed that ICT was used in analysis of exam results, 60.9% strongly agreed that ICT was used for preparing of students marksheets and 93.3% agreed that word processing was used and most activities were to a low extent. The study concluded that ICT was mostly used in

analysis of examinations results, preparation of students' mark lists, generation of report cards and clerical work such as word processing. The study recommended that the government through its agencies intensifies ICT in-service training to boost integration capacity. The study aligned with Adu and Olatundun (2013) that most educational management tasks were still under manual operations with no gain from ICT innovative levels.

Great expectations accompanied the introduction of ICT in schools, an initiative that the government embraced. A study to establish effects of ICT application on strategic educational quality standards management in PSS in Bungoma South, Bungoma County, Kenya, Oguta, Egessa and Musiega (2014) opined that only 40% had embraced ICT in School Financial Management (SFM), 59.36% either rarely or never used ICT in SFM, 59.4% indicated that ICT was used in examinations hence the improvement. This study concluded that most schools in the study area were yet to embrace ICT as a tool for SFM due to lack of knowledge and skills.

These studies are valuable in their own contexts and insights learned are very informative however the current study would fill the gaps identified. Afshari *et al* (2010) study focused on principals' level of computer use and some contributing factors, Katulo (2009) case study explored the role of school principals in promoting and managing usage of computer in selected schools, Musau, Mulwa and Matemu (2016) carried out a study on integration of ICT in PSS administration, Chepkonga, Kimani and Okoth (2015) study sought to establish the determinants of principals level of integration of ICT in management of PSS, Musambai, Ndirangu and Mukhwana (2017) study investigated the use of ICTs in educational management in PSS with focus on schools that received MOE grants for ICTs and Oguta, Egessa and Musiega (2014) study focused on effects of ICT application on strategic educational quality standards

management. None of these studies sought to establish extent of ICT integration in PSSM under principals' leadership, which the present study sought to do.

2.3 Factors influencing Principals' Leadership in Integration of ICT in Management

2.3.1 Financial Resources

There has been notable rapid growth in integration of ICT in schools' management characterized by changes aimed at realizing the 21st century technological demands. Principals are circumstantially forced to restructure processes to make ICT integration meaningful with regard to managerial output. However, the complexity of the 21st century ICT integration is undoubtedly expensive and requires colossal amount of cash to fix it.

Since the turn of the information age, the Kenya government committed itself to working towards practical realization of ICT integration in education institutions by investing in policy documents and financial resources. The National ICT Policy (MOE 2006) pointed out the high costs of ICT among challenges hampering ICT adoption in most parts of Africa with special reference to education sector. Issues of finance are akin to ICT integration given the likelihood of principals making new purchases, hiring and training of staff, renovations and innovations to uphold the principle of TCO. The observance of TCO is a meaningful consideration which depends on principals' leadership to make ICT integration happen.

Adomi and Kpangban (2010) study on application of ICT in secondary schools in Nigeria, identified several factors as influencing ICT use. However, 47% of respondents pointed out high cost of ICT facilities while 44% cited the low budget as cause of low level ICT application. The aspect of finances also affected other areas such as ICT infrastructure and adequacy of ICT facilities as indicated by 64% and 61% of the respondents respectively. Based on the findings, it

was concluded that despite the benefits of integrating ICTs, secondary schools in Nigeria were yet to adopt ICT on a wider scale.

In an investigation of the challenges principals faced in implementation of ICT in PSS in Meru County, Kenya, Laaria (2013) pointed out that various studies cited the issue of funds as a major factor influencing use of ICT in school activities. The high costs of acquisition and maintenance of ICT equipment was a hindrance to integration. The mean=1.41 from schools implementing ICT and a mean of 1.14 from schools not implementing was evidence that high cost was a hindrance at 10% level of significance. As Ndiwa (2014) would argue, computers are still costly in Kenya which makes it difficult for individuals and schools to acquire. These findings lend credence to Sessional Paper No. 1 of 2005 which indicated that high cost of ICT equipment, maintenance and Internet services weigh heavily on adoption and integration of ICT in education systems. The inference from the findings indicated that schools were constrained by the high costs level against ICTs hence little and no integration. The study recommended that to alleviate the problem on high costs, there should be a reduction in costs by adopting measures such as locally assembling education software alongside exploiting alternative technologies to avoid imported costly software and hardware.

To investigate factors influencing school principals' integration of ICT in PSS in Githunguri Sub County, Kiambu County, Kenya, Muchiri, Ndirangu and Kanori (2014) observed that 20% of principals, 10% of deputy principals and 13% of HODs cited high cost of maintenance of ICTs as major challenges to integration of ICT in PSS administration. This finding relates to financial resource constraints principals were faced with that eventually render them incapable of making any meaningful TCO for ICT integration. The study recommended that the MOE should come up with viable modalities that would reduce the digital divide in terms of required ICTs. To ease

the problem of high cost of maintenance, the study recommended that PSS should purpose to hire ICT technicians permanently to provide necessary services required.

Manduku, Kosgey and Sang (2012) in their study sought to explore the status of adoption and use of ICT in PSS with focus on Kesses zone, Wareng district, Uasin Gishu county, Kenya. They found out that according to 95.2% of respondents, lack of financial support was a challenge when it comes to ICT use. This affected many other areas that required funds to make the environment more responsive to the needs of a knowledge based society. The study concluded that most schools were yet to fully embrace ICT in performing school management tasks.

In a study to investigate the influence of ICT in educational management in schools that received MOE grants for ICT in Kakamega County, Musambai, Ndirangu and Mukhwana (2017) established that lack of Internet; technical support and inadequate computers in schools were major challenges facing principals in the integration of ICT in administration. It was however observed that such factors were not in isolation but were associated with lack of finance to address the issues in question. In the recommendation, the trio drew in government and other stakeholders to support schools financially to mitigate challenges hindering integration. This implied that ICT integration was perhaps not receiving adequate support to enable integration.

2.3.2 Training in Information Communication Technology

Integration of ICT in institutional management requires knowledge and skills in which principals' leadership through staff development policy provides training and professional development in the field, periodic or sporadic. To think of equipping teachers with ICT knowledge and skills, principals as professionals require technological skills and capabilities to influence positive outcome of quality services.

Seyal (2012) preliminary study on school administrators' use of ICT in Brunei revealed that professional development was a solid investment in technology integration and the achievement of the organizational goals. He posited that 92% of administrators argued that content intensive professional development in ICT was paramount to provide skills in computer technology, collect and analyze data and use in their administrative work. He opined that school administrators had some considerable level of literacy but their expertise and skills to use email for communication was basically low. While training is very important in handling a new idea like ICT integration, the central features to fast track the process include close contact with techno-savvy colleagues; sharing of knowledge and gaining support from the environment to provide informal skills.

Nangue, Creunen and Church (2010) case study in Cameroon focused on factors that impact on successful integration of ICT in schools. They asserted that a whopping 83.3% of teachers were in agreement that basic knowledge in computers through training enabled ICT implementation although only 26.2% had formal training. It was deduced that if knowledge and skills were anything to go by, then a very small group integrated ICT in management. The study recommended that the government should provide more training through seminars to teachers so as to acquire the most needed basic knowledge and skills for ICT integration. This could be done by facilitating teachers for training programs.

To establish the state of science and technology infrastructure in both public and private secondary schools in Nigeria, Salawu (2012) observed that inadequate training among teachers as indicated by 80% was rated as a second constraint. The study recommended posting of ICT qualified personnel to institutions, further train and re-train the unqualified teachers for best

service outcome in ICT use. The implication was that even with ICT infrastructure in place, teachers could not integrate ICT competently due to inadequate training

According to the Kenyan Sessional Paper No. 1 of 2005 on policy framework for education, training and research, ICT literate workforce is the platform on which to develop a knowledge based economy. The sessional paper aimed at bringing Kenya to global competitiveness in this information age (MOES&T, 2005) through professional development. The government further developed the National ICT policy and a strategic plan for ICT which paved ways for widespread use in government educational administration included. Based on these policy documents, education and training requires principals to implement policies to the letter.

Ngugi, Ogola and Kithinji (2012) sought to investigate into the extent of the use of ICT in education management in PSS in Naivasha district, Kenya. The findings revealed that the level of computer literacy among principals was low. According to principals, 39% were computer literate while 61% were not but on levels of computer literacy, 82% had basic knowledge while 9% had certificate and diploma. The study further established that 100% of secretaries, 83% of bursars and 67% of deputy principals were computer literate. The literacy levels were associated with foundation skills basically to communicate, analyze and solve problems using ICT. The study concluded that school staff were fairly prepared for ICT use in school management but still recommended to MOE to facilitate further training for teachers in ICT to enhance competence.

Training in ICT equips users with confidence and competence to integrate ICT in administrative tasks while lack or low levels of training gives contrary results. Makhanu and Kamper (2010) study on principals' literacy in ICT, towards improving PSS performance in Western Province, Kenya, revealed that 41.98% of principals had access to ICT infrastructure however, only

34.91% were ICT literate out of which 28.08% applied ICT in management activities. The study inferred that availability of ICTs was not enough to warrant integration but principals should acquire more skills to integrate ICT in management tasks.

2.3.3 Administrative Support

Principals' leadership is a key player in the adoption of ICT in schools. In a study carried out to establish the educational needs of faculty members regarding ICT use at the school for the handicapped in Turkey, the findings revealed that use of ICT depends on faculty members' interest but advised that school principals could lend a helping hand by organizing in-service courses and updating the school website for faculty use (Unluer *et al*, 2010). The administrative support could be diverse depending on the school and teachers needs. Principals' administrative support borders positive attitude towards ICT integration. To implement a program, it's incumbent upon the principal to hire personnel to support and manage ICT infrastructure in school. This requires the principal and staff at large to be ICT savvy given that ICT is an essential component in organizational management processes. Principals need to be innovative in sourcing for resources to enhance integration and thereby providing an enabling environment for team work. Through observation, some schools had enough computers but principals did not provide administrative support where every teacher would access and use the ICTs except for complaints on lack of room and skills.

Administrative support plays an important role in the implementation of ICT in schools which includes but not limited to facilitation of ICT implementation through administrative support and motivation of users enhances level of use. Muriuki, Akala and Mbeche (2017) study sought to establish factors affecting the implementation of ICT education in public primary schools in Kajiado North sub county, Kenya. They observed that more than half (55.4%) of the respondents

disagreed and strongly disagreed with the statement that their schools supported them in ICT training with relevant and enough resources, 84.6% disagreed and strongly disagreed that they had access to financial support from their school for ICT implementation. However, 66.6% agreed and strongly agreed that they sought technical support whenever they experienced any challenge. Respondents rating on administrative support of ICT implementation demonstrated that 44% was good and excellent while 43% was average. The study denoted that administrative support such as Headteachers, PTA and BOM were identified as contributing factors affecting ICT implementation in schools. The study recommended that stakeholders such as the government should be more supportive to ICT implementation through provision of all material, conducive environment, financial and mounting seminars to sensitize headteachers on ICT integration in school programs.

Increasingly, the integration of ICT in management requires well equipped personnel with some form of training. Merireng and Koringura (2013) case study of West Pokot county, Kenya, on the effect of computers in management of secondary schools revealed that 84% of respondents agreed that principal's role in determining the use of computers in administration was to enhance staff training and development, 96% agreed that another role as mobilization of necessary resources while 84% further agreed that another role was to encourage staff to use computers. The study drew the conclusion that most principals enhanced staff training and development and also encouraged staff to use computers. They recommended that principals and teachers should work as a team towards enhancing determination of computer use in school administration and that all stakeholders should be involved in provision of resource materials. This implied that teachers were cognizant of the role of training in integration of ICT which would then influence teacher competence, confidence and self-efficacy in pertinent administrative tasks.

2.3.4 Internet Connectivity

Ghavifekr, Afshari, Siraji and Seger (2013) in their paper on ICT application for administration and management in Malaysia opined that the Internet and ICT in general had penetrated education systems globally. They indicated that Internet use in administration had the advantage of faster and easy communication among teachers and students through some social media platforms such as Facebook, email and twitter. Besides, through Internet administrators had the opportunity to access important data and online resources. This means that with the Internet, it is apparent that it influences good administration and management activities.

According to Nangue, Creunen and Church (2011) most of Sub Saharan African countries indicate that a good number of them are yet to integrate ICT in schools or if any they, are still at infancy. In their study on guidelines for successful integration of ICT in schools in Cameroon, they observed that lack of ICT infrastructures in schools as indicated by 66.7% of respondents and inaccessibility as stated by 51.9% would basically be a hindrance to integration in management. Some respondents argued that such factors are a problem that cuts across nations especially in developing countries.

Internet connectivity in schools is the enabling power for principals to reach out far and wide. Abdelhawed (2016) conducted a study on barriers to implementation of ICT in public Sudanese secondary schools with focus to teachers perspective. The study revealed that while 75% of teachers had ICT skills in Internet use, in a relatively equal measure, 74.5% of the respondents cited low Internet connectivity as a barrier to ICT use. This implied no factor can stand alone in the integration of ICT where knowledge and skills in ICT was affected by low internet connectivity. Based on the findings, it was concluded that the MOE Sudan had not done enough

in terms of reliable Internet connectivity. It was recommended that the government steps in to improve on Internet connectivity in schools.

Kimuyu, Kalai and Okoth (2016) study sought to establish factors influencing principals' integration of ICT in administration of PSS in Kitui Central Sub County, Kenya. The Internet connectivity was available as indicated by 28.6% and that most schools 71.4% were not connected to the Internet implying that Internet was not used in management functions like email communication. It was concluded that although schools were well equipped with computers, laptops and mobile phones and poor Internet connectivity forced to teachers and headteachers to waste quality time in cyber café. It was recommended that school principals together with school management bodies should work together to install ICT related infrastructures like Internet and power supply.

Kajiado county is fairly semi-arid and Nyanchoka, Matula and Kalai (2015) study on factors influencing principals' integration of ICT administration of PSS in Isinya sub county, established that 65% of schools had reliable Internet connection unlike 35% that were not. They observed that the high Internet connectivity was attributed to government commitment of ensuring that every school had access to the Internet that facilitated principals' high levels of Internet use in management activities. The study drew the conclusion that availability of ICT in principals offices served as a motivation for principals to integrate ICT in administrative tasks. However, availability alone was not sufficient to integrate ICT but a combination of factors. Based on the study findings, it was recommended that school principals should strive to install ICT infrastructure like Internet to enhance faster communication

In Githunguri Sub County, Kiambu County, Kenya, Muchiri, Ndirangu and Kanori (2014) carried out a study to establish factors influencing school principals' integration of ICT in

administration of PSS. The findings revealed that 80% of PSS had no Internet connectivity while 20% cited slow Internet connectivity. Similarly, while 25% of HODs were able to download information from Internet, 15% cited slow Internet connectivity as a challenge. It was concluded that deputy principals and HODs accessed ICT resources more often than principals even when the very resources were inadequate. Some of the administrative tasks performed included registration of students and downloading information from Internet. The study recommended that principals should interact more with ICTs so as to be familiar with challenges faced as well as benefits accrued from effective use of ICT. This implied that even schools with computers that relied on Internet had a challenge unless other means of creativity applied.

2.3.5 Technical Support

Technology is said to be expensive and characterized by complexities in its use which calls for technical support to manage unnecessary breakdowns emanating from in competencies. Tagalou, Massourou, Kuriakopoulou and Efthimiopoulous (2013) study investigated the significance of ICT use in public administration of schools in Athens. They posit that although technical support was important in ICT integration, 62.7% of administrators never offered technical support in their schools but provided technical support through colleagues with knowledge and skills in informatics and computer (48.1%), Private Corporation (37%) and students' parents (11.1%). This implied that school administrators outsourced technical support rather than hiring.

One of the factors influencing ICT integration in secondary schools management is lack of technical support. Muriithi and Zengele (2015) conducted a study on management challenges of using ICT for administration at secondary schools in Kirinyaga County, Kenya. The study findings established major challenges in ICT integration in schools as inadequate experience in use of ICT in management (Mean=4.03; SD=.810) and maintenance of ICT equipment (Mean=2.78; SD= 1.375). The maintenance of ICT equipment was lowly rated because the schools were in the practice of using computer teachers and outsourcing services from private IT

expert firms to service the devices. The diverse challenges faced were rated highly regarding ICT integration. It was concluded that principals, HODs and teachers had inadequate ICT training obtained informally which then called for technical support to build confidence among teachers and provide services on device maintenance.

Laaria (2013) study on leadership challenges in implementation of ICT in PSS in Meru County, Kenya established that 64.44% lacked technical support to oversee maintenance and repair of ICT equipment. From these studies, it is common place that most schools never hired qualified technicians for reasons known to principals. The study concluded that to forestall these challenges, principals should make their support visible in technical support needed by keeping in consultation with stakeholders and teachers on how to alleviate the problem by providing administrative support on staff development.

Technical support is a crucial aspect in integration of ICT in management tasks given the complexity of the ever technological advancement. Manduku, Kosgey and Sang (2012) study sought to establish challenges on adoption and use of ICT in enhancing management in PSS in Kesses zone, Uasin Gishu county, Kenya. The findings indicated that avast majority of respondents (88.1%) observed that lack of technical support would create insurmountable challenges in integration. The study concluded that there were a myriad of correlated challenges that hindered the adoption of ICT in management. Key among them included limited knowledge and skills among users which would then require technical support most of the time of integration. The study therefore recommended that the TSC should make it a staffing priority to post ICT savvy teachers to schools.

2.3.6 Access to Information Communication Technology Equipment

The geographical set up and socio-economic status of an institution determines accessibility to ICT equipment. The success of ICT integration in schools is dependent upon the level of hardware and software availability and accessibility by the subsystems. Despite great improvement in telecommunication infrastructure in Tanzania, Internet connectivity was limited to few schools in urban areas yet majority of registered schools were located in semi urban and rural settings. Accessibility to ICT infrastructure was mostly limited by poor ICT network coverage especially in rural Tanzania (Swarts & Wachira, 2010). Poor connectivity to government ICT infrastructure influenced availability and accessibility in schools as well.

Teachers' accessibility to ICT as a determinant for its integration in management activities at various levels is subject to discussion. Kiptalam and Rodrigues's (2010) study sought to establish Internet utilization in both urban and rural schools with Internet connectivity in Kenya. The findings established that 98% of teachers accessed Internet at school out of which 82.7% accessed Internet in school for 40 hours per month while 18% accessed for 20 hours a month, 73.5% accessed through computer labs, 29.6% in principals' office, 12.2% in library and 25.5% in their lounge and offices. These findings indicated that the proportion of teachers accessibility to Internet was statistically significant at 0.05 significance level. Conclusion was that use of Internet and its integration in curriculum and administration in secondary schools is getting more widespread; and its use more as a means of communication and information searching which have made effective ICT investments in education, translating into better utilization of ICT related technologies with positive impacts.

Makhanu and Kamper (2012) study established the relationship between principals' access to ICT and school performance in western province, Kenya. They posit that 63.3% of secondary

schools had access to electricity infrastructure, 36.7% did not, 55.3% had access to computers as opposed to 44.7%, majority 84% had access to Internet and email against 16% that never had, 8.5% had access to video and digital cameras while 100% had no access to surveillance cameras. These findings unveil the wide digital divide in principals' access to ICT infrastructure in both performing and non performing PSS. The study concluded that Internet and email, printer, electricity and computers were easily accessible to principals while database and word processing were most available software. Cummulatively, it was found that a relatively low percentage (41.98%) of principals had access to ICT items in schools. It was therefore recommended that principals and other stakeholders still had some work to do in terms of making ICT available in schools.

2.3.7 Power Supply

Electricity is a major pre-requisite for ICT integration to materialize however other forms of power supply such as solar energy and generators would still suffice. Dionys (2012) study focused on the introduction of ICT and multimedia into Cambodia's teacher training centres. The instability of electricity infrastructure due to frequent blackouts notably had a bearing on ICT integration especially for teachers in class management activities. The study concluded that although progress had been made, integration of ICT was found to be some way off.

In discussing ICT for effective management of secondary schools for sustainable development in Ekiti state, Nigeria, Adeyemi and Olaleye (2010) study established that the most notable constraint in ICT usage was the regular disruption of electricity supply as indicated by 100% of respondents. The intermittent disruption of power supply can really be frustrating and more often than not lead to loss of data, breakdown of devices which consequently calls for technical support and funding. The study concluded that disruption of electricity was an inhibiting factor

to ICT integration in management activities. It was recommended that the government supports schools by providing generators as backup for power supply to forestall electricity disruptions.

Oluoch, Ajowi and Bosire (2015) study determined factors limiting the usage of ICT in delivery of management services in PSS in Siaya County, Kenya. The study revealed that 56% of principals, HODs and secretaries, 53% of DPs and 47% of account clerks and bursars pointed out lack of electricity as a factor limiting ICT usage in PSS. The findings were a signal that majority of schools lacked electricity as a requisite for ICT integration which could be linked to lack or inadequate finances to facilitate installation. It was concluded that several factors including power supply hindered ICT usage in management services. Recommendations were directed to stakeholders to work in collaboration with the government to curb such challenges.

2.3.8 Time Resource

Time is a valuable resource for ICT integration in institutions. Studies have shown that lack of time is a barrier to ICT integration in management tasks with various studies pointing out the issue of limited time in use of technology. Khan, Hasan and Clement (2012) literature review on barriers to introduction of ICT into education in developing countries in Bangladesh observed that there was teacher shortage and as such they were overburdened with workload. They argued that to use technology, teachers required adequate time to learn how to use both hardware and software, to plan and collaborate with fellow teachers. It was concluded that lack of time also borders lack of administrative support to teachers and recommended that teachers need adequate training to support them with knowledge and skills on ICT use plus change of attitude towards ICT use. The principals have several roles and responsibilities in line with ICT integration and organizing for seminars and workshops in ICT integration would suffice.

According to Manduku, Kosgey and Sang (2012) survey of adoption and use of ICT in enhancing management in PSS in Kesses, Wareng district, Uasin Gishu County, Kenya, 47.6% of teachers indicated that limited time is one of the challenges faced in the adoption of ICT in management. They argued that teachers need adequate time to prepare material especially where they are required to convert hard copies to soft copies given their workload. The study concluded that among the several challenges faced in the adoption of ICT in management was lack of time resource. Such challenges among others were the reason most schools were stuck on traditional methods of ICT adoption in management. The nature of ICT integration requires adequate time especially with teachers short of knowledge and skills besides insufficient ICT equipment.

Makhanu and Kamper (2010) carried out a study on principals literacy in ICT: Towards improving secondary school performance in Western Province, Kenya. The findings indicated that 26.1% of respondents disagreed that lack of time was a challenge, 9.1% were undecided, 46.3% strongly agreed while 18.1% agreed that time was a challenge in school performance. Based on the study findings, it was recommended that principals should delegate duties to other staff members to create time for use of ICT. This finding on time resource is important for principals leadership to understand and develop strategies on time as a resource in the integration of ICT in school management functions.

2.3.9 Attitude towards Information Communication Technology Integration

Attitude can be seen as positive or negative sentiment, the mental state learnt and organized through experience and exercise discrete influence on affective and cognitive responses of a person to another. The integration of ICT in management fairly depends on the attitude of the person to integrate. People's attitudes towards new innovations are fundamental to diffusion. Afshari *et al*, (2010) study on principals' use of ICT and contributing factors in Tehran, Iran

opined that 78.8% of principals were positive towards ICT use in management while none was negative. Their positive attitudes were manifested in the high $MS=4.05$, $SD=0.44$ which illustrated that principals had an emotional feeling towards computer use. The introduction of ICT in management is relatively new in secondary schools and varied attitudes accompany such change bearing in mind TCO implications. The study recommended that programs should be put in place to sensitize principals on the benefits of ICT and also provide support in pulling resources towards ICT integration management tasks.

A leader with positive attitude towards the success of ICT integration would benchmark schools that have good reputation for the establishment of an effective ICT system in management. The initiative broadens knowledge and ideas to positively rethink integrating ICT hence influence their attitude towards change (Adu & Olatundun, 2013). In their study on assessment of ICT situation in senior high schools in Lower Manya Krobo district, Ghana, Adebisi- Caesar, Offei and Dontwi (2012) contend that 87.9% of respondents had never used a computer and had no intention of using it. Such attitude would not motivate teachers to keep abreast with the modern technologies. It was concluded that older teachers associated ICT use with younger generation than the old. They recommended that policy formulators should come out clear with an ICT policy document and give direction on its implementation with essential guidelines. This would enable implementing agencies like the Ghana Education service and ministry of finance help make sense out of it.

In Isinya Sub County, Kajiado County, Kenya, Nyanjira, Matula and Kalai (2015) study on factors influencing principals integration of ICT in administration of PSS observed that 75% of principals' responses indicated that they used ICT in administrative tasks while 15% did not. This implied that principals with positive attitude embraced ICT use and vice versa. The study

concluded that principals' with positive attitude towards ICT use would endeavour to use since they comprehend the benefits and the converse is true. They recommended that principals should be engaged in seminars and workshops so as to develop positive attitude towards utilization of ICT in school management. This was on the premise of positive benefits associated with utilization of ICT in management that would help surmount challenges.

The principals' attitude towards ICT integration is a contributory factor for success or failure. Kimuyu, Kalai and Okoth (2016) study sought to establish factors influencing principals' integration of ICT in administration of PSS in Kitui Central Sub County, Kitui County, Kenya. The findings established that principals had positive attitude towards ICT integration where 85.7% pointed out that integration of ICT in exam results analysis saved time and provided accurate work and communication with stakeholders through text messages. It also emerged that 46% of respondents preferred email than text message as it was more official in communication. However, at least 32% viewed communication through text messages as rather none official while 64% posited that ICT infrastructure was costly and schools couldn't afford. The study concluded that teachers and principals held negative attitude because of lack of competence and technical support to ameliorate fear of equipment breaking down or incompetence.

2.3.10 Teachers Age

Age of the school principals plays a significant role in successful integration of ICT. In a study on the influence of aging on the experience of ICT in United Kingdom, Medeiros, Crilly and Clarkson (2012) contend that older adults tend to develop a less positive relationship with products consequently; lesser integration of technology. The study concluded that both older and younger adults have varied needs and expectation with regard to product functionality. That the level at which such needs and expectations were met generate feelings like attachment,

satisfaction or frustration, excitement or fear, motivation or avoidance. In all these feelings be it positive or negative, this will eventually determine use of technology. To this end, there was a likelihood of less interest in technology, acceptability and adoption which creates barriers between the young and the old adults with abilities to wade through a digitized world. If such adults were principals, they would hardly provide effective ICT integration in school administration.

Muchiri, Ndirangu and Kanori (2014) conducted a study on factors influencing school principals' integration of ICT in administration of PSS in Githunguri sub county, Kiambu County Kenya. The study established that 90% of principals were 50 years and below, 70% of deputy principals and 90% of HODs were 50 years and below. In all circumstances, age was interpreted as a positive attribute and right age for principals, deputy principals and HODs to develop interest for effective ICT integration in administration work on the premise of benefits associated with it. Despite the principals age, 60% of principals did not access ICTs and hardly used ICT in administrative tasks than deputy principals and HODs. Based on the findings, it was concluded that principals delegated too much to secretaries, deputy principals and HODs ultimately, principals rarely used ICTs in administrative tasks. It was recommended that principals needed to be positive by developing interest in integration of ICT in administrative tasks which could be done by accessing ICTs regularly for purposes of integration.

In a study to investigate factors that influence the integration of ICT in management of PSS with functional ICT infrastructure in Kitui County, Kenya, Mutisya, Mulwa and Mwanja (2017) established that there was a strong negative relationship $r(50) = -0.750$, $p < 0.05$ between principals' age and ICT integration. This means that the younger a principal is the more they are likely to integrate ICT in management. The hypothesis "there is no statistically significant

relationship between principals' age and ICT integration in management of PSS" was rejected and conclusion arrived at that there was a statistically significant relationship between principals' age and ICT integration in PSS management.

2.3.11 Influence of Operating Room on ICT Integration

The importance of operating room could be traced on the way ICT users accessed the equipment. The principals' leadership as they initiate the change process under the principle of TCO should more often than not consider room where ICT integration would take place. Inaccessibility to infrastructure includes operating room in which ICTs could be accessed. In a study carried out in secondary schools on science teachers' perceptions of the use of ICT tools, lack of suitable place for ICT integration such as resource room and ICT lab fully equipped with ICTs was found to be lacking (Almaghlouth, 2008). This implied that even with adequate ICTs, lack of room was a barrier as teachers could hardly access ICTs for lack of room.

Nangue, Creunen and Church (2011) study on guidelines for successful integration of ICT in schools in Cameroon established that both private and public secondary schools considered putting up school ICT labs to enable accessibility to ICT equipment. Such venture was associated with lack of room for every member in the school to integrate ICT. It was concluded that principals should work with stakeholders towards mobilization of resources to put up operating rooms. For that to happen, parents were compelled to pay a fixed compulsory fee towards ICTs, computer labs and computers to ensure availability of room for use.

Muriko, Njuguna and Njihia (2015) study revealed that only 16.6% of the respondents cited lack of room as a factor influencing principals' integration of ICT in administration in Kiambu county, Kenya. This means that most of the schools had adequate room to facilitate accessibility to ICT for integration. The trio opined that there was a whopping 91.6% of schools where lack of

finance was a major barrier to integration implying that principals were constrained in establishing room for most ICT users due to weak financial muscle. This was evidenced in areas where teachers could access ICTs including the principals' office or computer room. The study concluded that ICT was not adequately used because of the factors including lack of operating room however administrators held positive attitude towards use of ICT. It was recommended that the government, community and schools enter into partnership to support ICT course.

Adomi and Kpangban (2010) study was on application of ICT in secondary schools, Laaria (2013) investigated challenges principals faced in the implementation of ICT in PSS, Muchiri, Ndirangu and Kanori (2014), carried out a study on factors influencing school principals' integration of ICT in administration of PSS, Kitui central, Kimuyu, Kalai and Okoth (2016) study sought to establish factors influencing school principals' integration of ICT in administration of PSS with ICT infrastructure, Manduku, Kosgey and Sang (2012) explored the status of adoption and use of ICT in PSS, Musambai, Ndirangu and Mukhwana (2017) study was on the influence of ICT on the quality of education management with specific focus on PSS that had benefited from ICT grants, Seyal (2012) study sought to establish school administrators' use of ICT in Brunei, Nangue, Creunen and Church (2011) study sought to determine guidelines for successful integration of ICT in both public and private secondary schools, Nangue, Creunen and Church (2010) case study focused on factors that impact on successful integration of ICT in schools, Salawu (2012) sought the state of science and technology infrastructure in both public and private secondary schools, Ngugi, Ogola and Kithinji (2012) investigated into the extent of use of ICT in education management in PSS, Makhanu and Kamper (2010) sought to determine principals' literacy in ICT: towards improving PSS performance, Makhanu and Kamper (2012) sought to establish the relationship between principals' access to ICT and school performance,

Muriuki, Akala and Mbeche (2017) focused on factors affecting the implementation of ICT in education in public primary schools, Merirenga and Koringura (2013) study was carried out on effect of computer on management of secondary schools, Abdelhawed (2016) study was on barriers to implementation of ICT in PPS, Nyanchoka, Matula and Kalai (2015) study looked at factors influencing principals' integration of ICT in administration of PSS, Tagalou et al (2013) investigated the significance of ICT use in public administration of schools, Muriithi and Zengele (2015) study was on management challenges of using ICT for administration at secondary schools, Kiptalam and Rodrigues (2010) study looked at Internet utilization in both urban and rural schools with Internet connectivity, Dionys (2012) looked at the introduction of ICTs and multimedia into Teacher Training Colleges, Ayedemi and Olaleye (2010) study focused on ICT for effective management of secondary schools for sustainable development, Oluoch, Ajowi and Bosire (2015) sought to determine factors limiting the usage of ICT in the delivery of management services in PSS, Adebisi-Caesar, Offei and Dontwi (2012) did an assessment of ICT situation in senior high schools, Medeiros, Crilly and Clarkson (2012) study explored the influence of aging on the experience of ICT and Muriko, Njuguna and Njihia (2015) sought to establish factors affecting utilization of ICT in administration of PSS. While these studies contributed to the field of ICT variously, none sought to determine factors influencing principals' leadership in integration of ICT in PSSM, a gap the current study attempted to fill.

2.4 Principals' Involvement of Stakeholders in Integration of ICT

School stakeholders are variously involved in the development of schools either through own volition or principals' initiative. Richardson (2008) reviewed policy documents on ICT in education in Cambodia with particular focus on problems, politics and policies impacting implementation. He opined that the American Assistance for Cambodia funded for Internet

connectivity in rural schools and in collaboration with Japan Relief for Cambodia, solicited funds, constructed schools, installed solar panels and Internet connectivity. These were relevant PPP involvement in integration of ICT in schools and as evidence of positive role regarding ICT integration in developing countries. Although Cambodia is a developing country, involvement of PPPs promoted the status of ICT in schools regarding accessibility and availability hence up scaling the country's competitiveness with other developed countries. Principals' involvement of such PPP was indirectly noted as no organization would do development projects in schools without principals' knowledge, consent or request.

Katulo (2009) conducted a case study on the role of principals in promoting and managing computer usage in Caprivi region, Namibia. The study established that the MOE as a stakeholder provided technical support through the National Educational Technology Service and Support (NETSS). Principals also contributed towards ICT usage in one way or another, where they encouraged and motivated teachers to use computers and further provided technical support in management of computer labs. Besides, Computer Coordinators also supported the principals in teacher training to enhance knowledge and skill acquisition besides giving technical support. The study concluded that good leadership is a critical factor in the development of ICT which was supported by the presence of school principals in the acquisition of computers. However, principals in two case study schools did not take part in encouraging and motivating teachers to use ICT. It was recommended that principals should create contact time with teachers to provide an environment for teachers to share success stories and challenges of using ICT.

The integration of ICT in schools is sometimes guided by the desire to be competitive. Nangue, Creunen and Church (2011) study on guidelines for ICT implementation in schools in Cameroon observed that the integration of ICT in schools both in management and curriculum was

prompted by funding and parents. The PTAs were notably found to constitute a major source of funding for school projects by accepting to be levied so as to fund for school projects. This study established that PTA contributed financially a compulsory fee per annum towards computer acquisition, private donors and to some little extent through school fund.

The current policy on cost sharing in Kenya outlines the provision of physical facilities as the responsibility of PTAs in PSS (Ndhine, Njoroge & Ogwel, (Eds.) 2010). However, with 49.1% of rural population rated as absolutely poor (Kenya National Bureau of Statistics- KNBS, 2012), parents in such regions were hardly involved in ICT integration because of their economic status. Principals lean on policy provision to involve PTAs in ICT integration for financial support. The MOE (2006) National Policy on ICT bearing in mind the newness of the phenomenon, outlines strategies of successful ICT integration which include entering into partnership with both public and private organizations to support the course.

Muriko, Njuguna and Njihia (2015) study sought to establish factors affecting utilization of ICTs in administration of PSS in Kiambu Sub County, Kiambu County, Kenya. In establishing how PSS acquired ICTs, it was observed that 61.03% of schools acquired ICTs through School Funds (SFs), 27.27% through government funds, 5.19% through CDF and donors and 1.9% through New Partnership for Africa's Development (NEPAD). This finding portrayed a picture that most schools acquired ICTs through their own initiative but CDF and donor support was minimal. The study concluded that most schools did not have a school ICT policy which led to ad hoc acquisition of computers. It was recommended that the MOE should increase its budgetary allocation for purchase of computers and administrative software to minimize reliance on parents.

In an investigative study of the factors that influence the integration of ICT in management of PSS with functional ICTs, Mutisya, Mulwa and Mwanja (2017) indicated that most of the computers in schools were provided by the government (52%), donations (22%), parents (20%) and community (6%) while 67.2% of teachers observed that the community provided security. It was further revealed that most schools received between 11- 15 (44%) and 5-10 (36%) computers from the government. Based on the findings, it was deduced that the government was the major source of computer acquisition in PSS with other support in coming.

The government of Kenya has made substantial progress towards ICT compliancy as documented in several of the government policy documents (MOEST, 2005; & 2006). According to MOES&T (2012) a grant of Ksh. 877,500 was provided to facilitate acquisition of ICT equipment to improve managerial efficiency and effectiveness in schools. Government funding of such colossal amount of money to PSS was positive towards technology, however principals involvement of MOE was unknown.

Musambai, Ndirangu and Mukhwana (2017) investigative study focused on the influence of ICT on the quality of education management in secondary schools which had received MOE grants on infrastructure in Kakamega county, Kenya. They asserted that PSS had since 1990 been receiving computers by way of donations or purchases. In Kakamega county, 45 PSS received computers through the Economic Stimulus Program (ESP), 23.85% of schools were financed by school BOM, Computer For Schools Kenya (CFSK,14.3%) and by Strengthening of Mathematics and Science in Secondary Education (SMASSE,14.3%). This demonstrated the role of partnerships to supplement government support in ICT establishment in schools.

In a study on opportunities and challenges for use and integration of ICT in management of PSS in Bungoma South district, Bungoma County, Kenya, Kukali (2013) observed that PSS received

ICTs skewed towards curriculum but through principals' leadership some were converted to management tasks. For instance, only 34.38% as opposed to 65.63% received various ICTs from both CDF kitty and ESP. While schools with high enrolment reported an impressive PTA involvement in integration of ICT labs, maintenance and or computer acquisitions, 46.87% had non functional computers. Donor involvement included website management as was indicated by 6.25% and capacity building by 3.13%. The PTA and CDF office involvement in integration of ICT was fronted by principals through conversations and proposal writing on the subject.

Richardson (2008) reviewed policy documents on ICT in education in Cambodia with particular focus on problems, politics and policies impacting implementation, Katulo (2009) conducted a case study on the role of principals in promoting and managing computer usage, Muriko, Njuguna and Njihia (2015) study sought to establish factors affecting utilization of ICTs in administration of PSS, Mutisya, Mulwa and Mwana (2017) investigated factors that influence the integration of ICT in management of PSS which had received MOE grants for ICT infrastructure and Kukali (2013) study focused on opportunities and challenges for use and integration of ICT in PSSM. None of these studies focused on principals' involvement of stakeholders in ICT integration in PSSM, a gap that the current study attempted to fill.

2.5 Principals' Technology Leadership in ICT Integration

2.5.1 Infrastructural Change

Since the recent past, school technology leadership has become commonplace in educational institutions on the premise that it is a critical determinant in the realization of preferred outcomes and successes in schools with complimenting considerations. The integration of ICT in school functions is a fairly new concept especially in developing countries requiring dynamic leadership to address changes that come with ICT. Principals standing out as critical actors in transforming

school environment to realize effective change in ICT integration face huge tasks of reinventing schools in societies that have been transformed.

Samanciongulu, Baglibel, Kalman and Sincar (2015) study on the relationship of TL roles and profiles of school principals and technology integration in primary school classrooms in Konya, Turkey. They contend that there was a positive but weak correlation detected between technology integration and the support dimension ($\rho=.193$; $p<.01$). This means PTL has a relationship with ICT integration in PSSM although it is not a key factor based on the findings. Further afield, this was associated with lack of vision regarding technology use which did not support teachers in terms of technology use. The study concluded that principals did not have a clear vision regarding technology use in schools as such, did not support teachers strongly in terms of technology use. However, technology integration was part of a shift in power relations, control of knowledge and traditional school organizations. Therefore, principals as technology leaders play a critical role in determining whether technologies would be used effectively and are strong predictors of technology use with regard to infrastructural provisions.

Richardson (2008) analyzed policy papers, government documents, personal experiences and experiences from other countries on ICT in education reform in Cambodia. He observed that out of 698 secondary schools, 13% had electricity, 8% generators while 4% had solar panels. Cambodian PSS were classified as lower (6%) and upper (35%) which had 1-2 computers for administrative purposes with 1.15% of schools having more than 10 computers. This statistical data pointed to the poor state of ICT infrastructure in Cambodia. It was further established that 75% of all secondary schools had no power supply while 6% of lower secondary and 35% of upper had minimal access to computers. Focusing on ICT in education in Cambodia, it was construed that an improvement of ICT infrastructure to allow access to all teachers, he postulated

that PTL was required to provide staff with required ICT infrastructure. Change was therefore required in order to constitute school restructuring rather than mere school reform.

Makhanu and Kamper (2012) conducted a study on the relationship between principals access to ICT and school performance in Western province, Kenya. They contend that ICT infrastructure (hardware and software) were necessary for ICT integration where 55.3% of principals accessed computers while in five of the poorly performing schools did not access because of lack of electricity installation. Generators and solar panels too were used in poorly performing schools hence a significant strong positive relationship ($p=.05$) between principals access to computers and school performance. The security department was worst hit in terms of ICT infrastructure as evidenced in 18.5% that had access to video camera as opposed to a greater part of 91.5% that did not access. There was a statistically significant weak positive relationship ($p=.05$) between principals' access to cameras and school performance. It was concluded that successful ICT integration was realistic when principals provided support which was sometimes beyond their capability. The study was useful as a source of reference in the distribution of ICT infrastructure as it implies that PTL was lacking in providing basic essentials in ICT integration.

In Kimilili sub county, Bungoma County, Kenya, Wanjala, Odhiambo and Ngumbi (2015) study on teachers perceptions on the use of ICT in the administration of PSS discovered that according to teachers 72.9% had word processors, 50.7% had spreadsheets, 35.8% had powerpoint, 20.2% had databases while 17.1% had others. Similarly, most schools had ICT hardware where 94.3% had desktop computers, 50.7% had printers which 87.5% cited as inadequate, 85.7% did not have laptops, 92.2% of scanners were inadequate, in 91.4% of were not available. Availability and adequacy of ICT hardware was based on school category and not PTL as such. The study concluded that although ICT facilities were used, desktop computers were the most common

hardware used and the available hardware were inadequate for effective use. This implies that PTL in response to infrastructural change was frail hence less integration.

2.5.2 Organizational and Policy Change

Organizational and policy changes are part of daily reinventing that school leadership is faced with. Al-Shajira (2012 citing Rogers 2003) opined that principals play a significant role in guiding change processes and ICT implementation. Principal's qualities edge descriptions of administrators, supervisors, organizers and facilitators which qualify them to demonstrate organizational and policy changes.

Tan (2010) review of empirical reports on technology leadership in Singapore posits that organizational and policy changes as other common actions undertaken by school technology leadership. He observed that school technology leadership is identified with establishment of technology school committees and sourcing for support including resources, staff development policy, budget for ICT and appointment of technology leaders at all levels. The study concluded that top school leaders in this case principals were assumed to be endowed with institutional power of technology leadership. To this end, several relationships were found between technology leadership and other factors and school technology leadership as a strong predictor of school technology use. These establishments form part of the organizational and policy change components required in integration of ICT.

The PTL denotes integration of ICT through organizational and policy changes. It is imperative to note that the introduction of technology in management is accompanied by opportunities for staff, students and parents to develop a common vision and shared purpose that gives credence to ICT integration. Ndiddle *et al* (2009) observed that lack of written plans on ICT use in most schools was blamed on poor leadership expected to provide guidance. Technology leadership

provides a clear vision and plan articulated by ICT experts under the invitation of the principal to guide effective integration. Successful technology planning is synonymous with other forms of school planning where technology savvy leader seeks for experts, professionals and engage in teambuilding as road map to achieving set goals.

In an investigative study of the role of principals in promoting computer usage in selected Namibian schools, Katulo (2009) observed that principals in their technology leadership need to have in place an ICT vision for their schools and strive to support teachers in realizing the vision. Support would vary from providing ICT equipment and offering technical support to staff development opportunities to ensure ICT integration in management. It was concluded that involvement of school principals in professional development programs mounted for teachers intrinsically motivated teachers to be committed towards the program.

According to Nangue, Creunen and Church (2011) case study on guidelines for ICT implementation in four schools in Cameroon, a school ICT policy is an essential management document outlining beliefs, values and goals. It collectively leads teachers to work as a team for the good of the school. Although the school ICT policy was crucial, the study revealed that 100% of schools neither had a school policy to guide teachers on ICT, an ICT plan nor staff development programs. The implication was that there were gaps between theory and practice in terms of ICT policy. The study concluded that policies were a compulsory guide for ICT integration and indeed the first step towards integration. However this important organizational and policy change aspect was elusive in all sample schools.

Kiptalam and Rodrigues (2010) case study on Internet utilization in rural and urban secondary schools in Keiyo District, Kenya, found that 64% of schools had an ICT code of conduct to

regulate computer and Internet usage in rural and urban schools. The code of conduct specifies time for computer use and regulations to observe regarding equipment use. In conclusion, it was observed that the level of teachers accessing computers at school was huge hence precautionary measures to observe in terms of following ICT code of conduct.

2.5.3 Culture Change

Culture is the way people think, perceive and feel about things in an organization. Tondeur, *et al* (2009) study explored both structural and cultural school characteristics and contribution to ICT integration in primary schools in Flanders, Belgium. Although culture change is resistible, it is the most effective mode to achieve high quality and sustained technology integration. Teachers' resistance to change is common place among the old who maintain status quo, translate into technology refusal. It is upon principals' leadership to initiate teacher motivation and participation in planning and discussions towards ICT integration in management.

In discussing use and management of ICT in schools' strategies for leaders in Nigeria, Adu and Olatundun (2013) opined that school leaders must develop a proper ICT school policy. The policy is a blue print designed for teachers to manage ICT programs in a systemic and progressive manner. They observed that a technology leader involves staff to enhance sense of control over change activity to minimize resistance. Staff involvement in school programs instill sense of ownership and encourage teambuilding as good characteristics of a technology leader.

To establish factors affecting implementation of ICT education in public primary schools in Kajiado North sub county, Kenya, Muriuki, Akala and Mbeche (2016) contend that 55.4% disagreed and strongly disagreed that they received school support on ICT training with relevant and enough resources. They observed that administrative support was rated as average (43%)

with regard to ICT training. This study concluded that ICT policies were not clear and at most schools lacked ICT policies to provide guidance and direction hence ineffective application of ICT. Lack of policies on support for professional staff development affect ICT use to a great extent. This was evidence of lack of adequate strategies in ICT development and training

Wanjala, Khaemba and Mukwa (2011) carried out a study on significant factors in professional staff development for implementation of ICT education in secondary schools in Bungoma district, Kenya. They asserted that teachers did not find ICT as threatening their jobs but reiterated that ICT integration was dehumanizing, isolating and that is prone to errors. The integration of ICT requires teachers to change the way they think and perceive ICT as a contemporary approach to management. Negative attitude towards embracing ICT integration would certainly affect effectiveness of the process. It was concluded that the potential of computer technology could only be realized if educators at all levels and schools in particular define the role of computer technology and plan for its appropriate use.

Samanciongulu et al (2015) study focused on the relationship of TL and profile of school principals and technology integration in primary schools, Richardson (2008) reviewed literature on ICT education reform in Cambodia with focus on problems, politics and policies impacting implementation, Makhanu and Kamper (2012) sought to establish the relationship between principals' access to ICT and school performance, Tondeur *et al* (2009) study looked at teacher education faculty members' attitudes and perceptions of technology professional development needs and relationships with regard to structural and cultural school characteristics and contribution to ICT integration in primary schools, Tan (2010) explored TL and lessons from empirical research, Katulo (2009) case study investigated the role of principals in promoting computer usage in selected Namibian schools, Nanague, Creunen and Church (2011) study

sought to establish guidelines for successful integration of ICT in schools, Kiptalam and Rodrigues (2010) study sought to determine Internet utilization of connected rural and urban secondary schools, Muriuki, Akala and Mbeche (2017) conducted a study on factors affecting implementation of ICT education in public primary schools, Mutisya and Mwanja (2017) study targeted factors influencing integration of ICT in management of PSS with functional ICT infrastructure, Wanjala, Khamba and Mukwa (2011) study sought to establish significant factors in professional staff development for the implementation of ICT education in secondary schools while the current study analyzed PTL in ICT integration with regard to infrastructural, organizational and policy and culture changes in PSSM.

2.6 Impact of Principals' Leadership in ICT Integration on Management

The life of an institution is characterized by documentation or record keeping for easier and faster access, references and information retrieval. Al-Sharija (2012) observed that principals by nature of their work communicate locally and sometimes globally. He argued that ICT integration provides an opportunity to share knowledge, enhance administrative processes and effectiveness on service delivery besides simplifying access.

According to Afshari *et al* (2010) study on principals computer use and contributing factors in Tehran, Iran, ICT integration improves principals' ability on school budgeting, monitoring and reporting management skills relevant to current information age. Besides, they asserted that Internet provides principals with an opportunity to improve management skills like decision making and problem solving. The email was the most accepted application among principals because they found the email as the most available, efficient and effective means of communication. This makes it easy and convenient for principals to communicate as they could easily access it on their cellphones and on average principals accessed computers 2-3 times a

week (MS=3.55; SD=1.05). The study concluded that while Internet had more benefits, if computers were effectively used in management, communication and decision making, they helped increase accountability.

A case study carried out on use of computers and Internet as supplementary sources of educational material in senior high schools of Tema Metropolis, Ghana, Amenyedzi, Lartey and Dzomeku (2011) argue that at least 30% of teachers who used computers and Internet for research and database to retrieve students' performance records described the process as faster and easier. The Internet and websites enabled teachers prepare improved professional records, share ideas and retrieve information that was not readily available in text books and environment. In conclusion, they observed that although ICT skills among teachers were limited, teachers had the willpower to learn about ICT integration. This was associated with the immense steps realized in management activities such as preparation of professional records and class management. The interest and motivation witnessed among teachers was evidence enough of the positive impact that ICT had. The government was therefore called upon to support teachers augment their knowledge and skills through training.

Computerizing reporting system in school saves on time for administrative staff as reports are generated automatically and in a common format. The management in turn harmonizes reports from teachers and work modalities to monitor and track students' performance in a better way. Through parental alert software, there is faster communication with parents hence cuts on cost implications. In addition, automatically generated cellphone calls, text messages and emails update parents on school matters (MOE, 2011) faster than if it was in print.

In a study to establish the application of ICT in school administration in PSS in Lang'ata division, Nairobi county, Kenya, Mue, Itegi and Kyalo (2014) study established that according to 37.7% of respondents, application of ICT was very effective, 36.8% noted that it was effective, 18.9% not effective and 6.6% were not sure about its effectiveness. The application of ICT in financial tasks like collection of students' fees and salary payment enhanced transparency procedures and avoided mishandling of school funds. It was recommended that the MOE should come up with policies that provide a framework for use of ICT in various administrative functions to realize 100% effectiveness.

Makhanu and Kamper (2012) study analyzed the relationships between principals' computer literacy and school performance. They contend that 54.3% of principals had access to database for student performance, admission records plus teachers demographic information. Principal's access to database had a huge role in influencing performance as those with printers, printed examination papers, results and report cards enhance productivity, cut on time and finance cost implications. However the study concluded that access to ICTs *per se* was not adequate to influence integration but must be accompanied by other factors like training, technical and administrative support for realistic ICT dispensation in schools.

The application of ICT in administrative tasks According to Wanjala, Odhiambo and Ngumbi (2013) study sought to establish teachers perceptions on the use of ICT in PSS in Kimilili sub county, Bungoma County, Kenya. They observed that 73.6% of respondents indicated that use of ICT in school administration saved time to a great extent, 64.3% affirmed that there was improved communication while 50.7% found improvement in the quality of reports. Further afield, 40% of respondents observed that somewhat use of ICT improved knowledge efficiency

while 47% asserted that ICT enhanced school image and competitiveness. It was concluded that use of ICT in school administration had positive effect if well planned and supported.

Afshari *et al* (2010) sought to establish principals computer use and some contributing factors, Amenyedzi, Lartey and Dzomeku (2010) examined use of computer and Internet as supplementary sources of educational material, Mue, Itegi and Kyalo (2014) study focused on application of ICT in school administration in PSS, Makhanu and Kamper (2012) analyzed the relationships between principals' computer literacy and school performance, Wanjala, Odhiambo, and Ngumbi (2013) study sought to assess the impact of principals' leadership in ICT integration on management. None of these studies sought to assess the impact of ICT integration on management, a gap that the current study attempted to fill.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers research design, study area, study population, sample and sampling techniques, instruments of data collection, procedures for data collection and methods of data analysis.

3.2 Research Design

Research design is an outline, plan or scheme used to generate answers to research problems. It intends to facilitate research in an efficient possible way to yield maximum information (Orodho, 2004). This study adopted descriptive survey and co-relational research designs.

According to Kothari (2004), descriptive survey concerns predictions, narration of facts and characteristics about individuals, groups or situations. Descriptive survey design was adopted for this study because as O’Leary (2006) suggests the design is fast and efficient in assessing information about the population. Cohen and Morrison (2000) observed that the intention of a survey research is to gather data at a particular point in time and use to describe the nature of existing conditions. The design enabled the researcher collect data on extent of ICT integration, factors influencing principals’ leadership in ICT integration, principals involvement of stakeholders’ in ICT integration, PTL in ICT use and impact of ICT integration on PSSM.

Kothari (2004), states that correlational research design determines the frequency with which something occurs or its associations with something else. This design explains the magnitude of relationships between variables and gives percentage of variance an independent variable has on a given dependent variable (Mugenda & Mugenda, 2003). This design was relevant as it enabled

the researcher to determine the factors influencing principals' leadership in ICT integration and to analyze the relationship between PTL and ICT use in PSSM in Bungoma County.

3.3 Study Area

This study was carried out in Bungoma County (Appendix M). It was purposively chosen as the study area due to numerous challenges that PSS face as far as ICT integration is concerned. The county is the third populous county after Kakamega and Nairobi respectively. The County comprised of nine sub counties namely Bungoma South, Bungoma East, Bungoma Central, Bungoma West, Bungoma North, Bumula, Mt Elgon, Cheptais and Kimilili (KNBS&SID, 2013).

Ralph, Helmut, Berthold and Chris (2005, cited in Saidi, Hamisi & Mutai, 2011) describes Bungoma County as being located on the slopes and foothills of Mt Elgon bordering Republic of Uganda to the West, Trans-Nzoia to the North; Kakamega on the South-East and Busia on the South-West. The County covers a land area of 3,032.2 Km² with a population of 1,375,063 (48% males and 52% females) forming 3.6% of national percentage (Saidi, Hamisi & Mutai, 2011).

Most learning institutions established working networks with banks where electronic financial transactions were made. With rich fertile soils, farming is a major economic activity. Industries included collapsed Webuye Pan Paper Mills (currently known as Rai Paper Mills), Nzoia Sugar Factory and Malakisi Tobacco Leaf Centre. Tertiary institutions included Masinde Muliro University of Science and Technology Bungoma and Webuye Town campuses, Kibabii University, Kibabii Diploma Teachers Training College and Sang'alo Institute of Science and Technology, 272PSS, 689 public and 342 private primary schools.

3.4 Study Population

The study was conducted in 272 Public Secondary Schools in Bungoma county, where the target study population consisted of 272 principals, 272 DPs (in charge of administration), 272 DOS and 1088 CTs.

3.5 Sample Size and Sampling Techniques

Using a simple random sampling technique, 27 (10%) of the 272 principals were selected to take part in the pilot study. A third of the remaining population of 245 which was approximately 82 principals were used in the actual study as recommended by Borg and Gall (1989). According to Borg and Gall (1989), at least 30% of total population is representative enough of the sample size. Principals were selected because being in management, they were concerned with decision making as key players in school leadership (Makhanu & Kamper, 2010), the reason why they were key in the current study. The principals who had earlier participated in pilot study were not considered during the actual data collection (Orodho, 2004).

Through simple random sampling technique 27(10%) DPs were selected out of the 272 to take part in the pilot study while through saturated sampling technique, the remaining 245 DPs were selected to take part in the actual study (Table 3.1 on P. 71). The DPs in PSS deputize principals, they are in charge of discipline, curriculum implementation, public relations or communication with stakeholders like parents, teachers and students, they are secretary to staff meetings, in charge of timetable preparation and a silent member of BOM. Premised on their roles and responsibilities, DPs hold important positions in school management and therefore are in a position to respond to relevant issues concerning schools as key informants.

Through, simple random sampling technique, 27 (10%) of the 272 DOS were used in the pilot study while half of the remaining 245 DOS were considered to take part in the actual study as

respondents. The DOS were selected because they were in charge of Teacher Performance Appraisal and Development (TPAD), management of examinations, coordination of academic activities; are members of the timetable committee and advise the principal on resource material which in this case includes ICT.

Simple random sampling technique was used to select 11(1%) CTs out of 1088 CTs were used in the pilot as recommended by Orodho (2004) while a third (1/3) of the remaining 1077 CTs which was approximately 359 CTs were selected through simple random sampling techniques to be considered as participants in the actual study. The CTs were in charge of class management, students academic performance, admission records, discipline and physical infrastructure.

Based on their roles, DPs, DOS and CTs were selected as informants to provide information and for purposes of triangulation. The school was the unit of analysis where information received from principals, DPs, DOS and CTs was triangulated or merged to establish a common response that would represent the school as a unit of analysis. Table 3.1 below shows the distribution of study population, pilot sample and actual sample size.

Table 3. 1: Distribution of Study Population, Pilot Sample and Actual Sample Size

Respondent	Target Pop (N)	Pilot sample size		Remaining Selected Population (SP)	Actual sample Size		Returned rate	
		<i>f</i>	%		%	<i>f</i>	<i>f</i>	%
Principals	272	27	10	245	1/3 of SP	82	82	100.0
DPs	272	27	10	245	100 of SP	245	212	86.5
DOS	272	27	10	245	1/2 of SP	123	106	86.2
CTs	1088	11	1	1077	1/3 of SP	359	270	75.2

Source: Bungoma County Director TSC, 2015

3.6 Data Collection Instruments

Methodological triangulation approach including interview schedules, questionnaires, observation checklist and document analysis were used as data collection instruments. Structured interviews involve the use of predetermined questions and require high standardized techniques of recording responses. The method is ideal in a descriptive study because of its economical strengths and provides a safe ground for generalization. An unstructured interview on the other hand gives the interviewer an opportunity to probe interviewee to elicit in-depth information and collect supplementary information such as demographic data (Kothari, 2004; Mugenda & Mugenda, 2003). Each category of respondents was treated individually during sampling and the number of questionnaires to a particular category was based on the number of respondents required for the questionnaire.

A questionnaire for DPs was sent to 245 PSS who were in charge of administration, 123 for DOS and 359 for CTs. For CTs, the number of questionnaires submitted to each school depended on the number of streams in that particular school and through lottery method, the CTs to participate in the study were selected. Saunders, Lewis and Thornhill (2007) asserted that 100% response rate was not evident but the sample size should be large enough to ensure adequate response for the required margin of error. The reason for a large sample size is to ensure high response rate is obtained to present a representative sample.

3.6.1 Interviews

3.6.1.1 Principals' Interview Schedule

Face-to-face interviews were used to collect data from 82 (30%) principals who were selected to take part in the study as respondents. Use of interviews enabled the researcher probe respondents for in-depth information and clarification (Weirsam & Jurs, 2005). According to Marshall and Rossman (2001) an adequate sample size is the one large enough to respond to research

questions but should not be too large to prohibit in-depth analysis. Unstructured interview was used to collect data on extent of ICT integration in PSSM, factors influencing principals' leadership in ICT integration, principals' involvement of stakeholders in ICT integration, PTL in ICT use and impact of ICT integration on PSSM (Appendix D).

3.6.2 Questionnaires

3.6.2.1 Principals' Questionnaire

A closed ended questionnaire for principals was used to collect data on factors influencing principals' leadership in ICT integration, PTL in ICT use and impact of ICT integration on PSSM (Appendix B).

3.6.2.2 Deputy Principals' Questionnaire

A closed ended questionnaire for DPs was used to collect data on extent of ICT integration in PSSM, factors influencing principals' leadership in ICT integration, principals' involvement of stakeholders in ICT integration, PTL in ICT use and impact of ICT integration on PSSM (Appendix C).

3.6.2.3 Directors of Studies' Questionnaire

An open and closed ended questionnaire for DOS collected data on extent of ICT integration, factors influencing principals' leadership in ICT integration, principals' involvement of stakeholders in ICT integration, PTL in ICT use and impact of ICT integration on PSSM (Appendix D).

3.6.2.4 Class Teachers' Questionnaire

An open and closed ended questionnaire for CTs was used to collect data on extent of ICT integration, factors influencing principals' leadership in ICT integration, principals' involvement of stakeholders in ICT integration, PTL in ICT use and impact of ICT integration on PSSM

(Appendix E).The questionnaires were designed and administered to different respondents as illustrated above with intention of getting different views from them which were later used for triangulation purposes. Triangulation facilitates validation of data through cross verification from two or more sources by involving use of multiple data sources to produce understanding (Honorene, 2017).However, same questions were used to avoid biasness during data collection.

3.6.3 Observation Checklist

The observation method involves human or mechanical observation of what people actually do or what events take place. In the current study, activities that were observed included evidence on integration of ICT in school management as well as availability of ICTs in schools and areas where they were integrated. This method was aimed at establishing the environment within which the respondents as claimed were operating in and to confirm data obtained through the questionnaires. This was non-participatory approach where principals' engagement in ICTs were observed incognito to allow them carry out their duties freely. This enabled the researcher to get a first hand evidence, to confirm and triangulate what was received from questionnaires and interviews (Refer to Appendix G, P.324).

3.6.4 Document Analysis Guide

Document analysis is a form of qualitative research in which documents are reviewed, interpreted, analysed and organized nonstructural information into a standard format that allows one to give voice and inference about characteristics and meaning of written and otherwise recorded information (Bowen, 2009). Analyzing documents incorporates coding of the content into themes similar to how interview transcripts are analyzed. In the current study, the researcher first identified a body of material from examined school documents such as school records related to

ICT integration in management where a system for recording of what was found in the material was created (Appendix H). The information was then analysed and presented in thematic form.

3.7 Validity and Reliability

Using Test Re-test and Content validity test methods, the quality control of research instruments namely interview guides, questionnaires, observation checklists and document analysis was carried out. This process was aimed at ensuring that the basics of the research instruments were valid and reliable in measuring the variables of the study. This exercise was carried out as described under validity and reliability.

3.7.1 Validity

3.7.1.1 Validity of the Questionnaires

Validity is a measure of how well a test measures what it is supposed to measure (Kombo & Tromp 2006; Mugenda & Mugenda, 2003). Content validity test was used to ascertain the validity of questionnaires and the revision of this instrument was done based on the feedback from experts from the School of Education, Maseno University. Before the instruments were given to the experts, the researcher prepared the rating scale for each of the items where the participants assessed whether such items were relevant or irrelevant to the research study objectives. Some of the items which were rated as irrelevant to the study objectives were eliminated and others revised to conform to standards as identified by participants. The responses given were used to determine validity content index which were used as a measure of instruments validity or suitability.

The formula which was used to calculate the content validity index is given below;

$$CVI = \frac{R}{N}$$

Where CVI = Content Validity Index

R = Number of respondents who rated all terms in the instruments as relevant

N = Total number of respondents who participated in the pilot study (Those who rated all items as relevant (R) plus those that rated some as Irrelevant (IR)).

As illustrated from Table 3.2, the overall CVI from the questionnaires was found to be 0.84. while the CVIs from Principals, DPs, DOS and CTs were 0.9, 0.74, 0.93 and 0.73, which were higher than the recommended 0.70 (Mugenda & Mugenda, 2003; Amin, 2005).

Table 3. 2: Content Validity Indices (CVIs)

Raters	Rated all items as relevant (R).	Rated some items as irrelevant (IR).	Total participants (R+IR)	Computation $CVI = \frac{R}{N}$	Validity Interpretation
Principals	24	3	27	$\frac{24}{27} = 0.90$	Excellent
Deputy principals	20	7	27	$\frac{20}{27} = 0.74$	Good
Director of studies	25	2	27	$\frac{25}{27} = 0.93$	Excellent
Class teachers	8	3	11	$\frac{8}{11} = 0.73$	Good
Total	77	15	92	$\frac{77}{92} = 0.84$	Good

3.7.1.2 Validity of Interview Guides, Document Analysis Guides and Observation Checklist

According to Trochim, (2006), validity of qualitative research tools such as interview guides, focus group discussion guides and observation checklist can be tested using specific techniques.

The proposed techniques according to Trochim (ibid), were adopted to ascertain the validity of qualitative instruments in this study. Triangulation was involved for purposes of examining and

formulating questions that would lead to possible evidence of information about ICT Integration in PSSM from different sources of information including literature review.

The pre-visit to selected schools prior to pilot study was done where peers we relocated to review questions about the topic of the study. For instance, the researcher would ask *Suppose they were the ones carrying out the study, which kind of questions would they have included in the instruments?*. This was done for the understanding of the current study through other peoples' perspectives. This approach yielded useful and highly in-depth information regarding people's motivations, concerns and behaviors about ICT integration in PSSM. The approach also helped in detecting problems including overemphasized points, underemphasized points, vague descriptions, general errors in the data and biases or assumptions that had been made during the instrument design. This is because validity of gathered information is vital to the entire process as incorrect or misinterpreted data could undermine the work.

At the time of designing questions used during interviews, terminologies and colloquial language was avoided in the designs to elicit simple understanding and subsequent response to questions by respondents. Conclusiveness was arrived at by looking at whether there is a relationship between the study variable and observed or expected outcome. The identified relationship would then be integrated in the research instruments. Internal validity is mainly concerned with casual (explanatory) case studies than exploratory case studies (Yin, 2009). In this case, the design of the question in interview guides were mainly based on the expected contribution of the study. Questions were therefore tested on whether or not the expected outcome would result from using a given set of questions.

External validity is concerned with the problem of knowing whether a study's findings are generalizable beyond the immediate case study (Yin, 2009). Therefore in the current study, questions were designed to have results generalizable and relate to other settings and studies. To establish construct validity considerations, the researcher carefully considered whether operational definition of a variable within formulated questions actually reflected the meaning of the concept of the study.

3.7.2 Reliability

3.7.2.1 Reliability of the Questionnaires

Reliability refers to the consistency of scores obtained by the same individuals when re-examined with the same test on different occasions, or with different sets of equivalent times, or under other variable examining condition. Orodho(2004), defines reliability as the degree to which a particular measuring procedure gives similar results over a number of repeated trials. It checks the accuracy and precision of the measurement procedure as well as the extent to which the test measures what it is tends to measure. Mugenda and Mugenda (2003) on the other hand defines reliability of the instrument as the extent to which the instrument is consistent or dependable when measuring a phenomenon. After ascertaining the validity of the questionnaire and interview guides, the researcher proceeded to establish their reliability. The internal consistency method based on the test re-test was administered after a lapse of two weeks. The results of the two trials were then correlated and the co-efficient of correlation that was obtained denoted the reliability of the instruments. In a pilot study, 27(10%) principals, 27 (10%) DPs, 27(10%) DOS were used. Hill (1998);Isaac and Michael (1995) and Treece and Treece (1982), suggested that a good sample size for pilot study should not be more than 10%for any population less than 300 respondents. Also 11 (1%) of Class Teachers was used in the pilot study based on Orodho (2004), who asserts that the number of respondents inpre-test should be as

small as about 1% of the sample size for any population of about 1000 respondents or slightly more.

Using similar questions in the designed tools, test re-test was administered among the same group of 27 principals, 27 DPs, 27 DOS and 11 CTs after an interval of 14 days. The results of the two trials were then correlated where the Test-Retest Reliability Coefficients (r) of the principals, DPs, DOS and Cts were computed. The following formula was used to calculate the Test-Retest Reliability Coefficients (r) between two scores from the same participants that were taken at different times.

$$r = \dots\dots\dots(1)$$

Where;

T₁ are the first test scores

T₂ are re-tested scores

N is the total number of pairs of test and retest scores.

After, calculating Test-Retest Reliability Coefficients (r) as illustrated in Table 3.3 on page 80 in the fourth column, the researcher also sought to establish how much the measured test scores associated with (r), were spread around a “True” score, as well as the level of significance of the coefficients of correlation. The reliability tests were therefore again expressed in terms of Standard Error of Measurement (SE_m) and in terms of standard error of co-relation (SE_r) where the SE_m and SE_r scores for each of the reliability coefficients were obtained using the following formulars:

$$SE_M = SD \dots\dots\dots(2)$$

Where,

SE_m =Standard Error of Measurement

S.D is the Standard deviation of the test scores

r stands for the reliability co-efficient

While standard error of co-relation was calculated using the following formula;

$$SE_r = \frac{1 - r^2}{\sqrt{N}}$$

Where;

SE_r =standard error of co-relation

r denotes Correlation coefficient;

N = Sample size in the pilot study

The calculated values of Test-Retest Reliability coefficient of correlation (r), Standard Error of Measurement (SE_m) and standard error of co-relation (SE_r) are presented in Table 3.3.

Table 3. 3: Test-Retest Reliability of Principals, DPs, DOS, CTs Questionnaires

Participants	Test Attempts	N	(r)	Interpretation	Mean	Std. Dev	SE_M	SE_R	Level of Sig
Principals	Test	27	0.86	Good Reliability	15.22	2.07	0.727	0.043	Significant
	Re-test	27			15.23	2.1			
DPs	Test	27	0.94	Excellent Reliability	22.3	6.77	1.697	0.022	Significant
	Re-test	27			22.28	6.93			
DOS	Test	27	0.95	Excellent Reliability	19.4	7.14	0.739	0.004	Significant
	Re-test	27			19.35	7.39			
CTs	Test	11	0.94	Excellent Reliability	19.4	7.14	1.783	0.035	Significant
	Re-test	11			19.35	7.28			

As observed from Table 3.3, Standard Error of correlation (SE_r) which is also called the probability value (p) measures the level of significance that is associated with Test–Retest Reliability coefficient of correlation (r) (Shreyas, 2013). While Standard Error of Measurement (SE_m) which measures the degree or amount of variability in a test administered to various groups of individuals, can be used to draw inference on whether the instruments can be relied upon or

not (i.e the higher the values of SE_m the more reliable the instruments are). In the current study, Test- Retest reliability coefficient of correlation (r) were as follows: principals ($r=0.86$), DPs ($r=0.94$), DOS ($r=0.95$) and CTs ($r=0.94$) which according to Gestanti (2015) and Human Resorce Guide (2017), shows that reliabilities were good for principals while DPs, DOS and CTs were described as excellent reliabilities. The Standard Error of correlation (SE_r) which is also called probability (p) associated with Test- Retest reliability coefficient of correlation (r) yielded the following p-values: Principals ($p=0.043$), DPs ($p=0.022$), DOS ($p=0.004$) and CTs ($p=0.035$) which were all significant at 0.05 level of significance. While Standard Error of Measurement (SE_m) which depicts the level of reliability, revealed that since SE_m for principals, DPs, DOS and CTs were all positive, it can be concluded that the instruments for all four categories of respondents were highly reliable and dependable for data collection (Shreyas, 2013).

3.7.2.2 Reliability of Interviews, Document Analysis Guides and Observation Checklists

Reliability of qualitative tools were ascertained by observing thematic analysis considerations in ensuring that expected responses to each and every question in the tools would be classified, coded and presented quantitatively. Consistency in code definition was also checked to ensure definition and their consistency conform to the recommendation (Creswell, 2014) which was aimed at enhancing reliability of the tools. detailed protocol, database and procedure was designed and followed to the letter as suggested by Gibbs(2007, cited in Creswell (2014) and transcripts were checked for errors and obvious mistakes. Selection of case studies and sources of evidence followed screening approach where questions designed were perceived as convenient to yield rich and reliable information (Yin, 2009) on ICT integration in PSSM.

3.8 Data Collection Procedures

A research permit was obtained from National Council of Science, Technology and Innovation (NACOSTI) through the School of Graduate Studies, Maseno University. The researcher obtained notification letter from Bungoma County Commissioner, Bungoma CDE and principals of sample schools. The researcher visited schools and informed respondents of the purpose of involving them in the study as respondents and the need for their honest responses. On the first and second visitations, the researcher met principals in their various stations and discussed about time, venue and administration of instruments. Pseudo names were used for respondents' anonymity and confidentiality on information they would give to enable them voluntarily make informed decisions (Mugenda & Mugenda, 2003; Orodho, 2004). The principals, DPs, DOS and CTs responded to self administered questionnaires while principals further responded to a face-to-face interview schedule as well.

3.9 Methods of Data Analysis

A mixed methods research approach of both quantitative and qualitative data analysis was used. John and Christensen (2004 cited in Makhanu & Kamper, 2010) observed that quantitative and qualitative research methods are compatible and could be used in a single study. Quantitative data collected through closed ended questionnaires was analyzed using descriptive and inferential statistics.

Descriptive statistics were mainly used to analyse qualitative data collected from interview schedules and open-ended questionnaires which were categorized, coded, summarized, arranged in accordance with the objectives 1, 3 and 5 of the study and analyzed descriptively. Results were presented inform of tables, graphs, frequency counts and percentages. According to Piel (1995), in data analysis, percentages have a considerable advantage over complex statistics.

Multiple Linear Regression (MLR) was used to analyze quantitative data to determine factors influencing principals' leadership in ICT integration and Chi-square to analyze the relationship between PTL and ICT use. Statistical Package for Social Sciences (SPSS version 16) and Excel Spread Sheet were the aiding statistical packages used for analysis. Multiple Linear Regression Model is always applied in cases where the interest is to find out the relationship between a variable (dependent variable) with two or more variables (independent variables). The method was applied to Objective 2 which sought to determine factors influencing principals' leadership in ICT integration in PSSM in Bungoma County.

The quantitative data collected were carefully cleaned and sorted in line with the study objectives in order to check for errors and inconsistencies. Data were coded in excel spread sheets and later exported to SPSS where various inferential statistical methods particularly chi-square statistics and were applied for analysis. Qualitative data on the other hand were transcribed and analysed thematically. Multiple Linear Regression Model was fitted to determine the relative/strength relationship between selected factors on ICT integration in DPs, DOS and CTs' offices. The collective contribution of the selected factors was determined by the multiple Coefficient of determination value of R^2 which lies between 0% and 100%. Calculation of R^2 in the current study was found to be important because it enabled the researcher to estimate the proportion of the variation in the dependent variable that is explained by the independent variables which were selected. The higher the value of R^2 , the more reliable would be the independent variables in explaining the dependent variable.

The multiple coefficient determination in the ML regression was calculated by the following formula;

$$R^2_{y,x_1,\dots,x_k} = \frac{\hat{b}_1 \sum_{i=1}^n yx_1 + \hat{b}_2 \sum_{i=1}^n yx_2 + \dots + \hat{b}_k \sum_{i=1}^n yx_k}{\sum y^2} \dots \dots \dots (3.1)$$

Where; R^2 is coefficient of determination, x_i 's are the independent variables and y is dependent variable. Multiple Linear Regression Model that was used is illustrated below;

$$Y = \beta_0 + \beta_1 X_1 \dots \dots \dots 3.3$$

Where Y is ICT integration in management of PSS

β_0 is a constant

$\beta_1, \beta_2, \dots, \beta_n$ are coefficient associated with respective independent variable in the model.

X_1, X_2, \dots, X_n are the independent variables for instance;

ϵ is the random term/ error term.

Chi-square statistics was used to analyse objective 4 to establish relationship between PTL and ICT use in PSSM. The chi-square formula which was used is illustrated below;

$$\chi^2_{\alpha} = \sum_{i=1}^r \sum_{j=1}^k \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \dots \dots \dots (3.2)$$

Where:

χ^2 is the Chi square value

O_{ij} is the observed frequency

E_{ij} is the expected frequency assuming independence

k =Number of categories of ICT integration

r =Number of categories of independent variables (PTL and ICT use in PSSM)

Furthermore the researcher calculated the effects size for both chi-square and for regression. This process was as follows;

To establish the effect size for chi-square, Cramer’s V which is one of the three different measures of effect size for chi-squared test, for instance; Phi (ϕ), Cramer's V (V), and odds ratio was used. Cramer’s V was used because it can be used for calculating effect size for bigger contingency tables unlike ϕ and odds ratio which are mostly used for calculating effect size for 2 \times 2 contingency tables. According to Cohen (1988), Cramer’s V is given by;

$V = \sqrt{\frac{\chi^2}{n \cdot df}}$, where n is total number of observation, and df is degree of freedom calculated by $(r - 1) * (c - 1)$. Here, r and c are the numbers of rows and columns of the contingency table.

Cramer’s V interpretation is given as illustrated in Table below;

Table 3. 4:Effect Size for Chi-Square Test, Cramer’s V and its Interpretation

Degree of freedom	Small		Medium		Large	
	From	To	From	To	From	To
1	0.10	0.29	0.30	0.49	0.50	>0.50
2 (<i>The study used df=2</i>)	0.07	0.20	0.21	0.34	0.35	>0.35
3	0.06	0.16	0.17	0.28	0.29	>0.29
4	0.05	0.14	0.15	0.24	0.25	>0.25
5	0.04	0.12	0.13	0.21	0.22	>0.22

Source: Cohen (1988); Kim,(2017).

To establish the effect size for regression analysis, Cohen’s f^2 which is one of the two appropriate tests for measuring effect size under multiple regression equations was used. The f^2 is defined as:

$$f^2 = \frac{R^2}{1 - R^2}.$$

Where, R^2 is the coefficient of determination of regression model or squared multiple correlation coefficient for the full model. This formula can also be written as;

$f^2 = \frac{sr_i^2}{1 - R_{full}^2}$, where the numerator is the squared semi-partial correlation coefficient for the predictor of interest and the denominator is 1 less the squared multiple correlation coefficient for the full model. In this study, f^2 was used the overall effect size of the regression while effect sizes for model predictors was measured using standardized regression coefficient (Beta values (β)). According to Nieminen, et al (2013), beta values can be used as effect size of regression model if they are standardized. This is because standardized beta coefficient compares the strength of the effect of each individual independent variable to the dependent variable. The higher the absolute value of the beta coefficient, the stronger the effect (Kelley and Preacher, 2012). The interpretation of the effect size (f^2) is given in the Table 3.5;

The interpretation of the effect size (f^2) for regression

Table 3.5: Cohen’s f^2 and its Interpretation

When df=2,	Ranges of the values of ‘ f^2 ’		Interpretation of Cohen’s f^2
	From	To	
Effect size for regression	0.02	0.14	Small effect size
	0.15	0.34	Medium or moderate effect size
	0.35	Above	Large effect size

Source: Cohen, (1988;1992; 2013); Freedman, (2009). Selya, Rose, Dierker, Hedeker &Mermelstein, (2012).

3.10 Ethical Considerations

Necessary ethical considerations were observed as required. Potential respondents were briefed on why they were picked on as respondents and allowed to respond to the tools in convenient and safe environment in school. The participants were assured of confidentiality and anonymity by asking them not to write their names and schools on the questionnaires which were aimed at eliciting co-operation, valid and honest information. The researcher observed confidentiality by not writing names in the data collection tools and discussion of the findings. Sanders, Lewis and Thornhill (2012) opined that informed participants make voluntary decisions and consent either

to take part in the study or not without any form of coercion. Researchers under the principle of informed consent provide adequate information and assurances for the respondent to understand the implications prior to data collection. Discriminatory and offensive language was avoided in the instruments to allow equal playing ground regardless of schools, age, economic status and performance among others. The guiding principles of research on acknowledgement of any published sources of other authors used in any part of the thesis to avoid plagiarism (Kothari, 2004) were observed. Primary data was presented with objectivity regardless of the discrepancies so as to paint a true picture of the situation on the ground.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

In this information age, educational institutions like other sectors are moving towards digitalizing management operations for effective and efficient service delivery. This study was designed to assess principals' leadership in ICT integration in PSSM in Bungoma County, Kenya. This chapter presents socio- demographic characteristics of respondents, data analysis, study findings and discussion based on the following objectives, to:

- (i) Establish extent of ICT integration in PSSM,
- (ii) Determine factors influencing principals' leadership in ICT integration in PSSM,
- (iii) Assess principals' involvement of stakeholders in ICT integration in PSSM,
- (iv) Analyze relationships between PTL and ICT use in PSSM,
- (v) Assess impact of ICT integration in PSSM.

4.2 Instruments Return Rate

This study targeted principals, DPs, DOS and CTs as respondents in PSS. Table 4.1 presents distribution and return rates of the instruments administered to respondents.

Table 4. 1: Interview and Questionnaire Return Rate

Target category	Target Number	Return rate	(%)
Principals	82	82	100
Deputy Principals	245	212	86.5
Directors of Studies	123	106	86.2
Class Teachers	359	270	75.2
Total	809	670	82.8

Observation checklist, document analysis guide and interview schedule were used in all 82 (100%) sample schools. A total of 809 questionnaires were distributed out to principals ($n=82$),

DPs ($n=245$), DOS ($n=123$) and CTs ($n=359$) out of which 670 (82.8%) were completed and returned. The total return rate of the instruments was 82.8% which was above the minimum of 70% that Berg (2004) described as good. The acceptable level of return rate was attributed to researcher's personal contact with respondents during interviews, questionnaire distribution, observation checklists and document analysis.

4.3 Demographic Characteristics of Respondents

This section provided respondents' demographic characteristics. Factors that formed parameters of inquiry included age, academic qualifications and respondents level of training.

4.3.1 Respondents' Age

Respondents were asked to indicate their age and their responses were analyzed as in Table 4.2.

Table 4. 2: Respondents Age

Age bracket	Principals		DPs		DOS		CTs	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Below 30	0	0.00	3	1.4	5	4.7	56	20.7
30-34	0	0.00	21	9.9	17	16	57	21.1
35-39	0	0.00	46	21.7	47	44.3	69	25.6
40- 44	22	26.8	84	39.6	27	25.5	47	17.4
45-49	35	42.7	45	21.2	6	5.7	24	8.9
50- 54	18	22.0	7	3.3	3	2.8	13	4.8
55 and above	7	8.5	6	2.8	1	.9	4	1.5
Total	82	100.0	212	100.0	106	99.9	270	100.0

There were no principals below 40 years of age while majority 35(42.7%) fell in the age bracket of 45-49 and this means they had worked either as DPs, DOS, senior teachers or HODs where they gained administrative skills as it is the procedure with TSC appointments. Respondents' age was important in management as different age presented varied attributes with major implications on management. Regarding the age of the DPs, only 3(1.4%) were below age 30

while majority 84 (39.6%) were between 40-44 years. The DPs 3(1.4%) were assumed not to have the required job group for TSC to make substantive appointment were in acting capacity. Most DOS 47(44.3%) were in the age bracket of 35-39 while 1(.9%) was 55 and above age bracket. Regarding CTs, 69 (25.6%) were between 35-39 years while 4 (1.5%) were 55 and above years old.

Age of the respondents was important to this study. Robins and Judge (2010) survey on the connection between a person's age and their level of embracing technology established that those in Generation Y commonly known as Millennials were more technology savvy than the old ones. To this end, it was expected that relatively young principals, DPs, DOS and CTs would be more at ease integrating ICT in management than those in the home stretch of their career. Respondents in the age bracket of 40 and above were believed to have adequate administrative skills and would consider making their work current in terms of management trending patterns.

4.3.2 Academic Qualification of Respondents

The respondents were asked to indicate their academic qualifications and their responses were as in Table 4.3. Table 4.3 presents results of respondents' academic level. Only 1(1.22%) principal was a PhD holder, majority of principals 53 (64.6%) were first degree holders, followed by 25 (30.5%) Masters holders in various disciplines and 3 (3.7%) with diploma.

Table 4. 3: Academic Qualification of Respondents

Academic level	Principals		DPs		DOS		CTs	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
PhD	1	1.2	0	0.0	0	0.0	0	0.0
Masters	25	30.5	34	16.0	13	12.3	26	9.6
Bachelors Degree	53	64.6	153	72.2	84	79.2	185	68.5
Diploma	3	3.7	25	11.8	0.9	8.5	59	21.9
Total	82	100	212	100	106	100	270	100

This was an indication that principals were knowledgeable enough to integrate ICT in management functions. There was no teaching member of staff with a PhD degree because after graduation, they seek for greener pastures (Bungoma county TSC, 2016). While none of DPs and DOSs was a PhD holder, majority in both categories (72.2%) and (79.2%) respectively had first degree and few had Masters and diplomas.

4.3.3 Respondents' Level of Training in ICT

Respondents were asked to indicate their level of training in ICT and their responses were summarized as in Table 4.4. Majority 52(63.4%) of principals had no training in ICT, while DPs 113(53.3%), DOS 68(64.2%) and CTs 141(52.2%) had workshop level of training in ICT.

Table 4. 4: Respondents' Level of Training in ICT

Respondents Level of Training in ICT										
Level	Principal		DP		DOS		CTs		Total	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
No training	52	63.4	64	30.2	5	4.7	12	4.4	133	100
Workshop level	15	18.3	113	53.3	68	64.2	141	52.2	337	100
Certificate level	12	14.6	27	12.7	20	18.9	78	28.9	137	100
Diploma level	2	2.4	6	2.8	7	6.6	23	8.5	38	100
Degree level +	1	1.2	2	.9	6	5.7	16	5.9	25	100
Total	82	100	212	100	106	100	270	100	670	100

Technology leader who is not techno savvy might not understand the importance of ICT integration which would certainly affect their administrative support to school subsystems. The sporadic workshop level of training indicated was inadequate to provide self confidence and efficacy in integrating ICT. The implication is that majority of respondents were not very well trained in ICT which could present a ripple effect on the integration of ICT in management processes (Table 4.4). This study revealed that 63.4% of principals lacked adequate formal training save for 18.3% at workshop level implying that since most principals had no training, integration of ICT was likely to be low.

4.4 Category of Schools

The respondents were asked to indicate the category of their schools and the results were as in Figure 4.1.

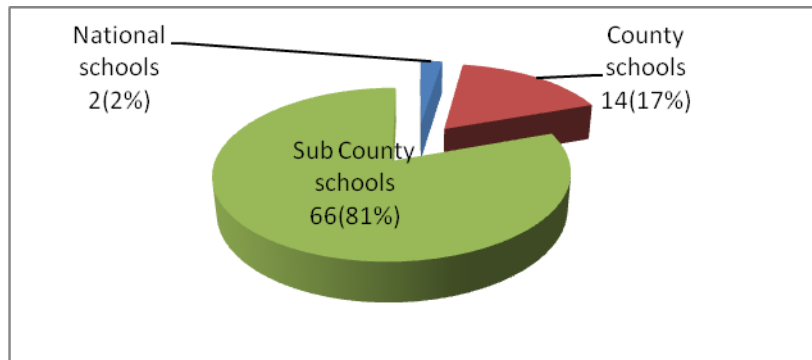


Figure 4. 1: Category of Schools

From the figure 4.1, 66 (81%) schools were sub-county, 14 (17%) county and 2(2%) national schools. Understanding the category of schools enabled the researcher fathom why there existed some digital divide among PSS.

4.5 Extent of ICT Integration in PSSM

4.5.1 Principals' Responses on Extent of ICT Integration

Principals were asked to describe extent of ICT integration in PSSM and their responses were summarized as in Table 4.5. From the findings, 79(96.34%) principals integrated ICT in registration and confirmation of KCSE candidates, 67 (81.70%) in communication with major stakeholders, 64(78.05%) in maintenance of teachers' performance records, 59(71.95%) in maintenance of BOM minutes, 43(52.44%) cited financial record keeping and a paltry 3(1.66%) in monitoring of activities and other management functions.

Table 4. 5: Principals’ Responses on Extent of ICT integration

Areas of Integration(<i>n</i> =82)	Great extent		Some what		Little extent		None		$\sum f_{in}$	MR
	f	%	f	%	f	%	f	%		
Registration and confirmation of KCSE students	49	59.8	22	26.8	9	11.0	2	2.4	282	3.44
Communication with stakeholders	43	52.4	17	20.7	13	15.9	9	11.0	258	3.15
Maintenance of teachers performance records (TPAD)	39	47.6	21	25.6	12	14.6	10	12.2	253	3.09
Maintenance of BOM and PTA minutes	38	46.3	23	20.8	14	17.1	7	8.5	256	3.12
Documentation of school plant	37	45.1	22	26.8	13	15.9	10	12.2	250	3.05
Financial records	36	43.9	23	28.0	16	19.5	7	8.5	252	3.07
Support staff demographic information	33	40.2	25	9.8	16	19.5	8	9.8	247	3.01
School achievement records	16	19.5	8	30.5	25	30.5	33	40.2	171	2.09
Research	8	9.8	8	9.8	28	34.1	38	46.3	150	1.83
Monitoring of school activities	3	3.7	13	9.8	24	29.3	42	51.2	141	1.72
Total	302		182		170		166		2260	27.56
Average Mean Rating										2.76

Key: MR= Mean Rating; RI= Likert Scale

The interpretation of mean rating on likert items according to Goos and Meintrup (2015) was as follows:

Mean Rating	Interpretation
<1.0	None
1.0-2.49	Little extent
2.5-2.9	Somewhat
3.0-4.0	Great Extent

As illustrated in Table 4.5, 59.8% of the respondents and 26.6% of the respondents amounting to 86.6% observed that ICT integration was to a great extent and somewhat respectively in four students’ registration and confirmation of KCSE. Although the exercise basically fell in the DOS office, principals argued that such an exercise would certainly be confirmed by the principal before submission to relevant offices. The principals’ responses on the item registration and confirmation of KCSE students collectively had a MR of 3.44. This demonstrates great extent in the integration of ICTs in registration and confirmation of KCSE students in PSS. According to KNEC(2012) directive, registration and confirmation of KCSE students should be done online

and given the sensitivity of exams in Kenya, principals hardly left anything to chance. For instance a principal observed,

“Exams in Kenya are sensitive and we have to look out for possible means to ensure we adhere to the online registration and confirmation of KCSE students guideline. With or without computers, laptops, Internet connectivity, we have no otherwise but to comply. This exercise among others have forced us to open school email address ”

The findings from document analysis revealed that schools without relevant ICTs like computer and email sought for expertise from the cyber café or requested teachers with such ICTs to assist in the exercise. This was confirmed from document analysis records such as BOM, PTA and staff meeting minutes, examination record files and meeting minutes. Those with ICTs, observation checklist data revealed that ICT resources including computers, laptops, flash disks, email, scanner, Internet connectivity and/or modem were used in the exercise. The implication was that with or without ICT devices in school, principals found a way of integrating ICT in KCSE matters. For this reason, schools disadvantaged by lack of electricity, ICT equipment and Internet connectivity were compelled to outsource alternatives like cyber café services or use of modems. The 2.44% schools that were not captured in this study were yet to sit for KCSE hence lack of such records as was established in school documents. This study was consistent with Wanjala, Adhiambo and Ngumbi (2013) study which established that 61.4% of PSS in Kimilili district, Bungoma County adhered to KNEC (2012) directive on online registration and confirmation of KCSE candidates.

The PSS are public entities in which communication with stakeholders from all walks of life is on daily basis. This study finding revealed that 52.4% of the responses demonstrated that ICT was integrated in communication with stakeholders to a great extent while 20.7% indicated somewhat cumulatively yielded a MR of 3.15 which depicts integration of ICT as to a great

extent. Information in and out to stakeholders including KNEC, TSC, MOE and KRA requires availability and usage of computers, laptops, emails and cellphones. However depending on school ICT status, communication could be done from within or without. Since the recent past, communication with government institutions is online and principals are circumstantially forced to comply by sometimes seeking services of cyber experts or techno savvy teachers for a helping hand. Data from document analysis such as staff meeting minutes PTA and BOM minutes revealed that schools without Internet connectivity sought cyber café services to communicate. Other stakeholders included but not limited to parents, guardians and teachers where cellphones and email were integrated. In some schools, *whatsapp* groups were communication platforms for teachers, parents and guardians, automated text messages and voice calls were some of the communication channels in use. Principals' communication with stakeholders was further established through observation checklist where school service delivery charter showed services offered and by who. This study concurred with Mutisya and Mwanja (2017) findings that ICT was used for communication where 50% was with teachers and 40% with parents. While the figures were relatively lower than what was established in the current study, the bottom line was that the extent of ICT integration was scaling up in PSSM. One of the principals observed:

“With new technologies, our work as a school is so effective. We have a school *whatsapp* group where all teachers, parents and guardians communicate anything about the school. The only disadvantage is *whatsapp* compliancy of members which is not a problem as such because we also use automated text messages and voice calls to reach out to members. We have another *whatsapp* group for BOM members, emails, automated text message through cellphones and even print media inform of letters, scanned and send to members. This extensively makes communication easy and faster”

A greater number of schools had problems with Internet connectivity in terms of installation or functionality while very few had functional websites to enable them communicate to parents and

well wishers or donors among others. Principals observed that at most, they accessed and communicated through cyber café, their smart phones or sought assistance from individual teachers and friendly schools with computers and modems whenever such failures were experienced. This study was divergent to Makhanu and Kamper (2012) finding where bulk of principals (84.0%) accessed Internet and email but concur that cellphones were used for communication. However Makhanu and Kamper (ibid) study was conducted in the larger former Western Province where provincial schools were fairly established than the current study where greater part were sub county schools. A principal observed:

“Other staff members such as DPs, DOS,CTs, school accounts clerk or bursar, secretary and matron or housekeeper use cellphones, email and of late the social media like *whatsapp* and Facebook to communicate among themselves and with some stakeholders. We have mandated DP, DOS, CTs and accounts clerks/ bursar to communicate with parents using cellphones or whatsapp on behalf of schools on certain issues. We therefore support them through provision of Airtime. For instance, in financial management, this is usually done with authorization and a minute to allow them carry out any operations”

Currently, promotions are based on teachers’ performance contracts and TPAD tool whether internal or external appointments as they exercise their professional duties and responsibilities. With or without ICTs to process such management functions, principals integrated ICTs such as computers, laptops, flash disks, printers, emails and scanners. The findings demonstrated that 47.6% integrated ICT in maintenance of teachers’ performance records especially on TPAD. This collectively gave a mean rating of 3.09. The interpretation shows that ICT integration on TPAD was to a great extent given that it’s a TSC policy that such records should be documented and submitted accordingly. Some principals observed “Information about teachers’ performance is so critical that it must be safely kept and with advanced technological devices, one is almost 100% assured of safe storage. We spend considerable time in cyber café since Internet connectivity can really mess just to ensure the reports are captured accordingly and submitted”.

Document analysis and observation checklist data revealed that data on TPAD which was processed by class prefects through hardcopies were herded to DPs who then forward to principals either through electronic or print media depending on the school ICT status. The principals finally submitted such reports electronically (through email) and occasionally through print to the TSC. Document analysis data established that every sample school had a TPAD which differed from Ngeno, Bett and Kimutai (2013) study in Bomet County, Kenya where 55% of schools had no TPAD with ICT integration. A principal observed:

“TPAD is another policy directive where with or without required ICTs we have no option but to do the online submission of reports. We are always in the Cyber café and sometimes ask teachers to assist us with their laptops for use. This has compromised confidentiality of the reports anyway but because of our lack of ICTs such as computers, laptops and Internet connectivity, we have no option”

The BOM, staff and in some instances PTA meeting minutes were prepared and stored on ICT storage devices to enhance quality on storage, safety and reference. The study established that 46.3% of principals integrated ICTs in maintenance of BOM, staff and PTA meeting minutes which amounted to a mean rating of 3.12. This was found to be to a great extent meaning a good number of schools were embracing ICT integration in recordkeeping. Schools without ICTs outsourced services like computers, laptops, emails and flashdisk to ensure BOM minutes were prepared and maintained. The principal being the BOM secretary plays a critical role in displaying their administrative competitiveness in ICT. For instance a principal observed “ Since we don’t have computers, we use our DOS laptop to type our meeting minutes and store or save on a school flash disk for future reference and retrieval”. From observation and document analysis it was noted that schools had emails and flashdisks even when they had no computers. Afshari *et al* (2010) in their study in Tehran, Iran observed that school principals were role models whenever ICTs were integrated in management tasks by encouraging creativity and

promoting technology friendly environment. Creativity and innovation is an item on the TPAD about the principal. To this end, majority of schools integrated ICTs in maintenance of BOM minutes by using available ICTs or outsourcing which enhanced creativity.

The role of principals with management bodies would require them to document information on the school plant which ideally explained development records, adherence to school site plan, safety policy standards and any other government or professional guideline. This kind of documentation could easily be used in sourcing for funding, pictures attached; information documented capturing the school history. The flash disks, computers or laptops could be integrated in documentation of the school plant. The findings revealed that 45.1% of principals integrated ICTs in documentation of the school plant which collectively gave a MR=3.05 which was interpreted as to a great extent. Although respondents asserted that ICT was integrated in the documentation of the school plant, document analysis data established that a good number of the administrative task was mainly in print and on flashdisks. One principal asserted “ Since we are not regular in making changes in the school plant, it is in hard copies and filed. We have not thought of saving it in soft copy, but I think its about time”. Conversely another stated “ we have our records safety stored in our computers and flashdisks and this has made it easier for us whenever a copy of the same is required”.

With the advent of technology, schools are working towards automating accounts transactions to ensure transparency and accountability as required by the MOE. The respondents (43.9%) indicated that ICTs were integrated in financial management which collectively yielded a MR=3.07 depicting great extent levels. However, one principal argued that with the ineptitude of principals, lots of school funds were lost in the hands of technology savvy accounts personnel. Observation checklist data revealed that in finance department, computer or laptop, printers, flash

disks and cellphones were mostly used in financial transactions. On the contrary, most school accounts clerks applied manual way because they were either unskilled in ICT or for lack of equipment. Although some principals allowed financial transactions through cellphone money transfer (MPESA) a respondent resented the practice arguing that: “Although MPESA transactions enable parents send money or do bank deposits, the method has its own challenges and I strongly discourage”. Document analysis data from BOM meeting minutes indicated that school financial transactions and in particular school fees in cases where MPESA Till Number was authorized by BOM through a minute to allow such transactions. Data from observation checklist revealed that MPESA and Till Numbers were displayed in the accounts office, principals or parents notice board. This study finding demonstrated that there was ICT integration in financial transaction but at a lesser level that Nyanchoka, Matula and Kalai (2015) study findings in Isinya Sub County; Kajiado County where a MS= 4.57 was the greatest among other administrative tasks.

A greater part of schools hardly paid their support staff through banks but with availability of well fitted computers and laptops with required software, payment vouchers for workers were easily prepared. The BOM or PTA meetings are usually preceded by principals preparation of school progress reports capturing financial and academic reports among others. Financed matters basically fall under the accounts office however; the school principal is the ultimate accounting officer. It’s for this reason that principals try to be in touch to enhance transparency and accountability. Document analysis revealed that support staff preferred cash payment rather than bank. A principal observed that sometimes workers go without salary for months and its unrealistic to pay them through the bank. This study was supported by Muchiri, Ndirangu and

Kanori (2014) that schools integrated ICT in preparation of support staff payroll where 30% strongly agreed and 60% agreed.

With the establishment of workers unions and National Social Security Fund (NSSF) for workers, schools are encouraged to have well documented records on support staff demographic information. The respondents (40.2%) observed that ICT was integrated in documentation of support staff demographic information as was collectively expressed in a MR=3.01. The integration was found on great extent levels. The information enabled principals in understanding support staff background so that in case of any eventuality, sometimes it is cumbersome in giving information than when it is safely stored on computer, laptop or flash disk. The demographic information provides data on the qualification of an individual being hired for a particular job hence very important to be documented. However, such records were under DPs custody guided by the principle of delegated duties where support staff are required to report to DPs. A principal opined “ Support staff records are at most in hardcopies because some submit them as hardcopies. We shall however institute ways and means of doing softcopy documentation”.

During schools quality assurance and standards assessment, there is an item that requires the principal to provide information on a brief history of the school. The findings revealed that 19.5% of the responses indicated integration of ICT in keeping records on school achievements. This translated into MR=2.09 that was interpreted as to a little extent even if the information outlines school achievements since establishment to date which must always be well documented. With ICT storage devices such as computers, laptops, email, flashdisks and website, it is easy for principals to retrieve information by a click of a button. School

achievements provide the insights on school leadership and with ICT integration in management singles out principal's leadership achievements. One principal observed

With performance appraisal, we are actually reporting on our achievements as principals and institutions which can only be effectively done through ICT storage devices. Other achievements including co-curricular activities and school general academic performance records could be stored in form of pictures or videos. Storage devices such as desktop computer, laptops, flaskdisk and email which are enhance security of the documents.

Instructional leadership requires school management to monitor students' progress through various records. Slightly over half of the sample schools encouraged teachers to keep students' progress records by using available ICTs. A principal from a less ICT equipped school stated "we have agreed as a staff that the few computers available in the DOS' office and secretarial pool would be used by all of us but those with personal devices could still use". Teamwork spirit encouraged teachers to keep students work with available ICT storage devices and typed hardcopies. This study resonates with Quest, Kandjeo and Mushaadja (2014) findings that principals' instructional leadership on computer literacy was weak hence lack of direction.

Sample schools with Internet connectivity enabled principals update their management skills like decision making, benchmarking success stories on performance, good leadership and teambuilding among others based on policies. A paltry 9.8% of the responses pointed out that ICT was integrated in research activities. Others indicated that they used the Internet to browse for their study material and benchmarking on best administrative practices and processes than travelling individually to distant institutions. A principal opined "Internet cannot be left to everybody in school to use at will because of the heavy bills and sometimes abuse of such facility. It is only prudent that we allow use in the DOS office and principal's secretarial pool".

Surveillance cameras are the latest information capturing and storage ICTs. However, this study established that only 1.66% of schools had the device. Document analysis data demonstrated that there was notable willingness in acquiring surveillance cameras to facilitate management and monitoring of the general school plant. However this study findings established that only 3.7% of the respondents pointed to ICT integration in monitoring of school activities giving a mean rating as 1.7, which was described as little extent. A principal observed “ we had an expert here who advised us on the importance of surveillance cameras and today we have at least one which we are in the process of installing to help us curb security issues in schools”. This study was dissimilar to Makhanu and Kamper (2010) findings where no principal had access to surveillance cameras. This implied that PSS were at infancy regarding surveillance camera integration in monitoring of school activities as nearly 100% relied on security personnel.

According to principals’ responses on various areas where ICT was integrated, with a MR= 2.76, it was interpreted to mean ICT integration was somewhat. This implies that that integration of ICT in PSSM was merely average.

4.5.2 Deputy Principals’ Responses on Extent of ICT Integration

The DPs’ were asked to indicate their level of agreement on extent of ICT integration in their office using a 4- point Likert scale where 3.0-4.0 = *Great extent*, 2.5-2.9=*Somewhat*, 1.0-2.49 = *very little* <1 = *None* and their responses were summarized as in Table 4.6 where the Mean rating (MR) for each item on the scale was determined and interpreted to measure rating intervals.

The DPs’ responses revealed that ICT was integrated on a greater extent in areas like advertisement of school tenders (MR=3.20), Communication with stakeholders(MR=3.89), Minutes of staff meetings (3.67) while Master time table was rated as very little with MR=1.20 (Table 4.6).

Table 4. 6: Deputy Principals' Responses on Extent in ICT Integration

Integration of ICT in DPs' office (n=212)	Great extent		Somewhat		Very little		None		$\sum f_{ri}$	MR
	f	%	f	%	f	%	f	%		
Advertisement of school tenders	73	34.43	112	52.83	23	10.85	4	1.89	678	3.20
Preparation of duty roster	17	8.02	92	43.40	23	10.85	73	34.43	463	2.18
Communication with stakeholders	193	91.04	15	7.08	4	1.89	0	0.00	825	3.89
Minutes of staff, BOM and PTA meetings	156	73.58	42	19.81	14	6.60	0	0.00	778	3.67
Teacher class attendance records	24	11.32	42	19.81	59	27.83	87	41.04	427	2.01
TPAD	46	21.70	98	46.23	68	32.08	0	0.00	614	2.90
Teachers' personal records	16	7.55	37	17.45	57	26.89	102	48.11	391	1.84
Maintenance of students' discipline records	32	15.09	41	19.34	61	28.77	78	36.79	451	2.13
Maintenance of support staff records	21	9.91	26	12.26	49	23.11	116	54.72	376	1.77
Master time table	6	2.83	9	4.25	6	2.83	191	90.09	254	1.20
Total									5257	24.8
Average mean rating					2.48					

Key: MR=Mean Rating , ri=Likert scale

According to Table 4.6 responses, advertisement of school tenders were through integration of ICTs was Somewhat as pointed out by 52.83% of DPs amounting to a MR=3.20 that was described as to a great extent. Observation checklist and document analysis data from BOM and staff meeting minutes illustrated that computers, laptops, printers, photocopier machines and websites were integrated in advertisement of foodstuffs on stores supplies. Under the principle of delegation and segregation of duties to improve on fairness, confidentiality and teambuilding, principals assign DPs to oversee tendering and tendering committee procedures. A part from online advertisements, ICT integration also included print outs to make posters for the adverts forming a greater part than actual online. The email and cellphones were handy for communication during tendering processes. This study harmonized with the Public Regulation Procurement (2006) which in Part V states that there should be preparation of tender documents, advertisements and invitation of tenders, tender securities and opening of such tenders. The

procurement regulation documented stages of tendering through which various persons would be involved to make the process all inclusive. However, document analysis of minutes of tendering committees were scarce especially in sub county schools implying non compliance with the tendering regulations.

Preparation of the school duty roster is a delegated duty to the DP and this study divulged that 43.40% integrated computers, laptops, printers and photocopier in preparation of school duty rosters. This yielded a MR= 2.18 implying little extent in integration. This study correspond with Muchiri, Ndirangu and Kanori (2014) and Mutisya and Mwanja (2017) studies where only 20% of DPs applied ICT in preparation of duty roster and timetable and 52% reported to a great extent respectively. The study construed that most DPs accessed ICTs despite shortage noted. From school document analysis such as staff meeting minutes, teachers were allowed to access ICT equipment available in the computer lab while others used principals and DOS department if any. Again, it is possible that Muchiri, Ndirangu and Kanori (ibid) construed accessibility to mean ICTs available in school unlike the current study that recognizes the principle of outsourcing to enrich accessibility and integration. Observation checklist information denote that most schools prepared their timetables using school computers, printers and photocopiers.

Communication with stakeholders is a key management component that upholds division of labour and promotes teamwork. A greater number of DPs (91.04 %) stated that integration included computers, printers, photocopier machines, Internet and cellphones in communication with stakeholders. The higher responses elicited a MR= 3.89 which described as great extent in ICT integration in communication with stakeholders. From observation checklist data, it was clear that the Internet was modestly integrated due to lack of the software. Today the cellphone is arguably the most available and accessible ICT in Kenya and world over. The extent to which

principals' integrated ICT in DPs offices was guided by the message to be communicated and as delegated. A greater part of DPs affirmed that ICTs were integrated in their office regardless of availability and accessibility which implied that DPs greatly integrated ICTs in communication through outsourcing, use of personal ICT equipment and/ or hiring secretarial pool services. This was confirmed from school document analysis such as staff, PTA and BOM meeting minutes where DP, DOS and CTs were assigned specific areas to communicate on behalf of the school.

This study was in convergence with Kimosop and Mulwa (2016) findings that cellphones were integrated in communication processes though usage scored a mean of 2.78 translating to 53.8% depicting rarely used and 46.2% frequently used. The Internet as communication channel scored a mean of 3.42 where 80.7% rarely used while 19.3% frequently used. The study concluded that cellphone and Internet integration posted a worrying trend that needed popularization.

During staff meetings in PSS, the DP is the staff secretary responsible for taking minutes, preparation and storage and in some cases silent BOM secretary. This study revealed that DPs (73.58%) integrated ICTs in preparation of staff meeting minutes by accessing computers, photocopiers, printers and flashdisks, by involving the services of secretaries or those with personal computers or laptops engaged them. This accumulatively gave a MR=3.67 which rated as great extent levels. Regardless of accessibility, staff and BOM meeting minutes were prepared and in some cases stored in relevant ICTs. From document analysis, it was identified that DPs had the provision of typing staff minutes within or without school environs.

With the onset of performance contract, teachers are appraised based on their performance usually related to class attendance records and other related professional areas within school activities. Institutions empowered class prefects to mark teacher class attendance register and list

of lessons attended or missed, recorded and submitted to DP. According to 41.04% of the responses contributing to a MR=2.01 indicated that teacher class attendance records were prepared by integrating computers, printers and or photocopier. The findings revealed that a good number of DPs' did not integrate ICTs perhaps due to inadequate or lack of equipment hence the little extent observed. Typed lists of work were nonetheless stored on computers or flashdisks depending on availability. From observations, document analysis and interviews, it was evident that most DPs offices were not furnished with ICTs however they could access from secretaries office or DOS.

Teacher appraisal in schools falls under DPs responsibilities. According to DPs' responses on TPAD records, 46.23% indicated that integration of ICT giving a MR=2.90 was Somewhat. It was understood given that uploading of appraisal forms was the duty of the principal where the Internet and email came in handy. However, the extent to which principals integrated ICT in DPs office on TPAD was taking shape being a TSC guideline that teachers must be appraised and forms uploaded to TSC headquarter. The TPAD is quite involving and really requires a techno-savvy personnel. This study disagreed with Ng'eno, Bett and Kimutai (2013) study in Long and central divisions of Bomet County, Kenya where 59% observed that there were no TPAD tools. Being a TSC policy it was not clear why the two divisions were not complying with the directive.

Personal teacher records are important documents and such data enables principals understand teachers' qualifications and capabilities. Since most DPs' offices experienced ICT shortage explained why there existed less integration in personal teacher records as illustrated by 48.11% that yielded a MR=1.84 interpreted as little extent. Document analysis data and interviews revealed that teachers personal records were kept by DPs in form of hardcopies under filing

system. Muriko, Njuguna and Njihia (2016) study disclosed that ICTs were rarely used in supervision of teachers as illustrated in a MS 2.44 while delivery of records to different offices was sometimes through ICTs (MS 2.76).

Students discipline is the duty of the school DP who is further obligated to maintain records on discipline cases. From document analysis though, it was evident that DPs were still curved in the old traditional method of pen and black book as a form of discipline documentation. Some respondents(36.79%) pointed out that there was no extent although the MR=2.13 was indicative of little extent in integration of ICT in maintenance of student discipline records. Contrary to the current study, Mue, Itegi and Kyalo (2014) findings recognizes that slightly over 34% of student respondents aligned ICT integration with monitoring of students while 21% thought otherwise. By interpretation, maintenance of student discipline records was not yet digitalized in most PSSM. A principal indicated that students discipline cases were recorded in a black book and students were required to make hand written letters mostly filed hence rare ICT integration.

According to school organ grams, support staffs report to DP where their personal documents were under the DP's custody. There was no extent in the integration of ICT in maintenance of support staff records meaning such records were in hard copies of hand written nature. Maintenance of support staff records was highly less digitalized as indicated by 54.72% reflecting MR=1.77 denotes the process under document filing system. This was affirmed through document analysis where records were manually done. This study was divergent to Nyanchoka, Matula and Kanori (2015) findings where ICT was integrated in staff personnel (MS= 2.40) with no particular reference to support staff.

The master timetable was prepared by DP but with competent DOS or in some instances the latter assumed the role. The master timetable usually prepared on a wide manila paper explains why DPs did not integrate ICT in its preparation. An impressive 90.09% of respondents asserted that there was no extent of ICT integration in DPs office with regard to timetable preparation while the MR=1.20 which was very little extent. This was attributed to commercial timetables which were manually fitted with relevant information which was supported by document analysis that DPs were responsible for master timetable making with a team drawn from HODs, CTs and subject teachers. Based on the Average Mean Rating (2.48), the study found out that the extent of ICT integration in DPs offices was to a little extent.

4.5.3 Director of Studies' Responses on Extent of ICT Integration

Table 4.7 provides DOS responses on their level of agreement on extent of ICT integration in their office. The findings indicated that ICT integration in all items listed under DOS office was to a great extent.

Table 4. 7: Director of Studies Responses on Extent of ICT Integration

Principals' ICT integration in DOS office (n=106)	Great extent		Somewhat		Very little		None		$\sum f_{ri}$	MR
	f	%	f	%	f	%	f	%		
Analysis of exam results	71	66.98	20	18.87	11	10.38	4	3.77	370	3.49
Registration & confirmation of KCSE candidates	79	74.53	14	13.21	6	5.66	7	6.60	377	3.56
Students' performance records	81	76.42	16	15.09	6	5.66	3	2.83	387	3.65
HOD records	78	73.58	17	16.04	7	6.60	4	3.77	381	3.59
Preparation of timetables	83	78.30	11	10.38	8	7.55	4	3.77	385	3.63
Teachers' performance records	71	66.98	19	17.92	11	10.38	5	4.72	368	3.47
Communication	100	94.34	6	5.66	0	0.00	0	0.00	418	3.94
DOS staff meeting minutes	88	83.02	9	8.49	5	4.72	4	3.77	393	3.71
Professional records	92	86.79	7	6.60	3	2.83	4	3.77	399	3.76
Total									3478	32.81
Average mean rating 3.65										

Key: MR=Mean rating , ri=Likert scale

On analysis of exam results, 71(66.98%) of the respondents indicated great extent, registration and confirmation of KCSE candidates 79(74.53%) cited great extent, documentation on students' performance records 81(76.42%) indicated great extent, HODs records 78(73.59%) indicated great extent, preparation of timetable 83(78.30%) stated great extent, teachers' performance records 71(66.98%) indicated great extent, communication 100(94.34%) cited great extent, DOS staff meeting minutes 88(83.02%) cited great extent, while in professional records, 92(86.79%) indicated great extent. Other details of results are in Table 4.7.

The DOS responses were a revelation that principals integrated ICT in their offices as portrayed by results where the highest score was to a great extent in all areas. This was interpreted to mean that ICT integration in the DOS office was vital hence given an upper hand in equipping the office with ICTs. The KCSE meanscore mentality encouraged principals to focus on equipping DOS offices with ICTs than any other subsystem. The respondents (66.98%) indicated that ICT was integrated in analysis of examination results giving a MR=3.49 which was interpreted as great

extent. Findings from document analysis and observation checklist revealed that every office of the DOS had ICTs ranging from flash disk, computer, laptop, scanner, printer, photocopier, modem or digital camera. Staff meeting minutes, BOM and PTA had at least an item on acquisition of ICTs for DOS to improve performance. The extent of ICT integration in DOS office could be associated with efficiency and effectiveness in instructional management to promote desired academics and exam performance. The DOS office is primarily concerned with exams and 66.98% of respondents observed that ICT was integrated in exam analysis, typing, storage and analysis of subject heads performance from continuous assessment exams to KCSE. This was quite in order as instructional leadership is apart of good leadership.

According to KNEC (2012), principals are directed and must adhere to registration and confirmation of KCSE candidates online directive to the letter. This study affirmed that most schools engaged DOS in the registration and confirmation of KCSE students 'candidature where 74.53% scored this activity at a MR=3.56 which was great extent. However, depending on the school staff establishment and division of labour, DPs do the registration and confirmation of KCSE candidates or could be new schools which were yet to register a fourth form. Registration of students for a national exam like KCSE is usually sensitive and at times principals take it upon themselves to ensure all is well. Document analysis revealed that registration and confirmation was done by the office of the DOS which was fairly furnished with ICT. Conversely, Mue, Itegi and Kyalo (2014) study confirmed that only 11.3% of sample schools had outdated computers hence difficulties integrating. Muchiri, Ndirangu and Kanori (2014) on the other hand observed that a paltry 20% of DPs and not DOS integrated ICT in registration of KCSE candidates. Improvement in online registration was associated with adherence to KNEC (2012) directive as in the current study.

School good exam performance has been the pride of most stakeholders and more often than not associated with principal's good management and leadership skills. For this reason, principals were up to the task to ensure students' class performance was tracked to gauge their likely results in KCSE. The exercise was conducted by DOS office through documentation of students' performance records where 76.42% indicated ICT integration that together gave a MR= 3.65 rated as great extent and a reflection of principals' investment in ICT in the DOS office. Observation check list data confirmed that most schools had desktop computers but lacked operating rooms while document analysis revealed that some computers acquired through well wishers were characterized by outdated software which rendered them incompatible with current software and therefore treated as obsolete. Nonetheless most of the functional ICTs were found in the office of the DOS. While Wanjala, Adhiambo and Ngumbi (2013) findings in Kimilili Sub County, Bungoma County, Kenya established that 94.3% of schools had computers, 77.8% opine that schools had inadequate computers since the DOS office consisting of a team of HODs; subject teachers access them for use. The implication is that although most principals furnished DOS office with ICT equipment than any other office, the equipment was hardly adequate.

The HODs report to DOS on departmental matters to do with academics and by virtue of their departments, they are automatically members of the DOS office team. The respondents observed that HODs' records were prepared and maintained through computers, laptops, flashdisks, printers and photocopier in DOS office. Then, 73.58% observed that ICT integration in HODs records was to a great extent which portrays the importance of ICT integration in DOS office as observed in a MR= 3.59. Document analysis and interviews data divulged that HODs being close to ICTs in the DOS office made it easier for them to have reports typed and stored in relevant

ICTs. It was acknowledged that ICT interventions provided sufficient positive results to meet the objective of investing in ICT as an aspect of good technology leadership.

The DOS in one of their duties in academics, prepare timetables for teachers and sometimes students. A good number of respondents (78.30%) yielding a MR =3.63 observed that principals' integration of ICT in the DOS office was to a great extent in preparation of timetables. Through document analysis, this finding point out that DOS office was up to the task on this function to enable teachers discharge their duties effectively. Integration of computers, laptops, printers, photocopier and *Whatsapp* platforms to ensure principal, DP, HODs, subject heads and CTs had timetables for various classes and subjects on time as was indicated in staff meeting minutes. Integration of ICT in timetable preparation ensured observance and adherence to schedule details for desired results.

The TSC directive that teachers' should be appraised based on their work performance is under DPs office but through the principle of teamwork, delegation and inclusivity requires that the DOS prepares and maintains teachers' performance records in respective subjects. The respondents 66.98% opined that principals' integration of ICT in this function was to a great extent (MR=3.47) as a matter of responding to the advancement of technology for global competitiveness. Through observation checklist it was divulged that the exercise involving typing, maintenance and recordkeeping was identified with computers or laptops, flaskdisks for safe storage and retrieval. It was aimed at ensuring teachers minimized absenteeism or skiving of lessons without genuine reasons. With this trend, schools were moving towards digitalization of management systems which according to TSC Code of Regulations(2005) purpose to strengthen supervision and continous monitoring of teachers maintenance of teaching standards.

As earlier mentioned, the DOS office is about academics and a greater part of stakeholders are interested in knowing students' performance. The DOS office do a lot of communication through cellphone calls, SMS, email, print and others through social media like *Whatsapp* platforms. In this study 94.34% of the respondents identified ICT integration in communication as great extent which collectively gave MR=3.94 implying the DOS office was busy hence the principals' purpose to equip with more ICTs. Through observation and document analysis, some ICTs were specifically for DOS office and even DOS were allowed to access ICT freely in ICT labs. The current study considered any form of ICT that would be used for communication be it outsourced or within school, bottom line was that there is integration. Since the DOS easily accessed one or more ICTs available in schools, more than 83.02% indicated integration of computers, printers and photocopiers in preparation of DOS staff or teams meeting minutes. Although this study and Mue, Itegi and Ndirangu (2014) held convergent views that principals integrated ICT in maintenance of BOM minutes, the later adds that DOS integrated ICT in preparation and maintenance of departmental staff meeting minutes.

Professional records are key tools that teachers are required to prepare and keep as evidence of their work in practice. In this study, ICT integration in preparation and maintenance of such records was overwhelmingly to a great extent as indicated by 86.79% of respondents which gave a MR=3.76. Recordkeeping exemplified competitiveness and relevance to new technological trends. Integration of computers, laptops, printers, photocopiers and flaskdisk provided essential environment for professional recordkeeping and this was established through observation checklist and document analysis ICT committee, DOS office records as evident in DOS office which was more techno savvy. Based on the Average Mean Rating (MR=3.65), it was rational that ICT integration was on a great extent in all DOS offices in PSSM tasks.

4.5.4 Class Teachers' Responses on Extent of ICT Integration

The CTs' responses on extent of ICT integration in class management were as shown in Table 4.9 where 102(37.7%) cited integration of ICT in preparation of students' report cards as somewhat, entering and analysis of students' exam marks 109(40.37%) cited great extent, maintenance of records 105(38.89%) rated somewhat, preparation of class timetables 103(38.15%) scored very little extent, communication was cited by 138 (51.11%) as great extent while in doing research work 200(74.07%) rated none.

Table 4. 8: Class Teachers' Responses on Extent of ICT Integration

	Great extent		Somewhat		Little extent		None			
CTs responses on extent of ICT integration (n=270)										
	f	%	f	%	f	%	f	%	$\sum f_{ri}$	MR
Preparation of students' report cards	92	34.07	102	37.78	63	23.33	13	4.81	813	3.01
Entering & analysis of exam marks	109	40.37	71	26.30	58	21.48	30	11.11	797	2.95
Maintenance of school records	16	5.93	105	38.89	53	19.63	96	35.56	581	2.15
Preparation of class timetable	41	15.19	88	32.59	103	38.15	38	14.07	672	2.49
Communication with stakeholders	138	51.11	66	24.44	60	22.22	6	2.22	876	3.24
Research	12	4.44	21	7.78	37	13.70	200	74.07	385	1.43
Total									4124	15.27
Average Mean Rating=2.55										

Key: MR=Mean Rating , ri=Likert scale

Class teachers are in charge of class management activities and physical facilities and the results depict 37.78% of CTs indicated integration of ICT in preparation of report cards which elicited a MR=3.01 meaning the extent was great extent. This does not imply that all CTs had ICTs for that matter but from observation checklists and document analysis, some schools had computers in the computer lab which teachers through a staff meeting or BOM meeting minute were allowed to access for professional purpose. In other instances report cards were generated through DOS

office and CTs were sometimes involved in preparation. The computers, printers and photocopiers were handy in carrying out this function. The interview data disclosed that teachers were only allowed to access ICTs for professional work and at particular times which then introduces the concept of ICT code of conduct to be adhered to.

Similarly, a modest number of CTs (40.37%) asserted that indeed they integrated ICTs as they entered marks and analyzed results to a great extent however the overall MR=2.95 was rated as Somewhat. Again this did not mean that CTs had ICTs particularly for class management activities but through other available ICTs in schools, personal equipment or through outsourcing services. The magnitude at which ICTs were integrated in this function explained the importance of exams in schools and the role played in integrating ICTs. A clean and quality analysis provides basis for school leadership to hold a discourse with stakeholders on the importance of integrating ICT in management. While this study corroborated with Muchiri, Ndirangu and Kanori (2014) findings which established that ICT was integrated in exam analysis, in the latter, DPs ideally covered the whole school than class work. The extent of ICT integration in class management was however dismal.

Record keeping and maintenance is a core management responsibility that CTs hold. A considerable number of CTs(38.89%) indicated that principals somewhat integrated ICTs in class record maintenance which totaled to a MR= 2.15. The ICTs integrated included students' records on discipline, absenteeism and performance which basically required ICTs like computers, laptops, printers and flash disks. Data from observations indicated that not all schools had the aforementioned ICT equipment but teachers used personal equipment or cyber services. Through document analysis, it was evident that professional records like schemes of work were commercially acquired and could not be associated with class ICT integration.

Class teachers in their class administrative roles are obligated to prepare specific class timetables for their relevant classes usually drawn from master timetable. Compared to the master timetable, class timetables are relatively small in content and this study established that only 38.15% of CTs integrated ICT in preparation of class timetables which was relatively to a little extent (MR=2.49). Preparation would require a computer or laptop and printer which could be inaccessible to CTs depending on the school ICT status. Document analysis data established that there was no CT assigned a particular ICT for class management, even so, schools with ICTs allowed teachers to access for use as was established in a Geography subject with computers.

Communication is a key aspect in management operations and for CTs this would involve teachers, parents or guardians and administration. The respondents (51.11%) argued that CTs integrated cellphones in communication at class level to a great extent in terms of text messages, voice mails and until the recent past, *Whatsapp* platforms. The responses provided a MR= 3.24 which was interpreted as great extent. Data from some documents however revealed that CTs were limited to specific areas that they communicated to parents or guardians on behalf of the school. Additionally, cellphones used were not for the schools but individual gadgets and rarely would principals provide CTs with airtime for this purpose. In some cases, teachers were still engrained in hardcopy and/ or pen and paper form of communication. This finding concurs with Wanjala, Adhiambo and Ngumbi (2013) on how teachers used ICT to support their work however, communication in their study was applicable to parents alone while the current study had teachers, administration and even parents or guardians. In PSS in Bungoma County, staff, BOM and PTA meeting minutes revealed that students were disallowed to use cellphones at school. However, considerations were given where a student was in need of basic personal effects, fees or text books, CTs communicated to parent or guardian.

In this information age, research has been made easy by simply browsing on your smartphone or Internet connected computers. However, 74.07% of respondents in this study opined that integration of ICT in class management for research had no extent giving a total MR= 1.43 that was little extent. The cost implications on Internet installation and maintenance plus poor service providers were assumed to be the reasons why it was not used for research. From document analysis data, it was clear that most schools did not have functional Internet connectivity. Interview data pointed out that Internet was costly and teachers restricted while in other situations there was no Internet connectivity. According to CTs; responses on the extent of ICT integration in class management tasks, the AMR =2.55 was interpreted to mean Somewhat extent. This was a good sign that PSS were moving towards digitalization of class management activities.

4.6 Factors Influencing Principals' Leadership in ICT Integration

This research question on factors influencing principals' leadership in ICT Integration was responded to on a 5-point Likert scale where respondents indicated their level of agreement on whether they Strongly Agreed (SA-5), Agreed (A-4), Undecided (U-3), Disagreed (D-2) or Strongly Disagreed (SD-1). To show variance in each category of respondents' views, (SA) and (A) meant there was influence while (D) and (SD) meant no influence. The principals' responses were presented in bargraphs under Figures 4.2 to 4.11, Tables 4.9 -4.11 shows descriptive results and Tables 4.12- 4.14 presents regression analysis for DPs, DOS and CTs' responses respectively.

4.6.1 Principals' Responses on Factors Influencing their Leadership in ICT Integration

4.6.1.1 Financial resources

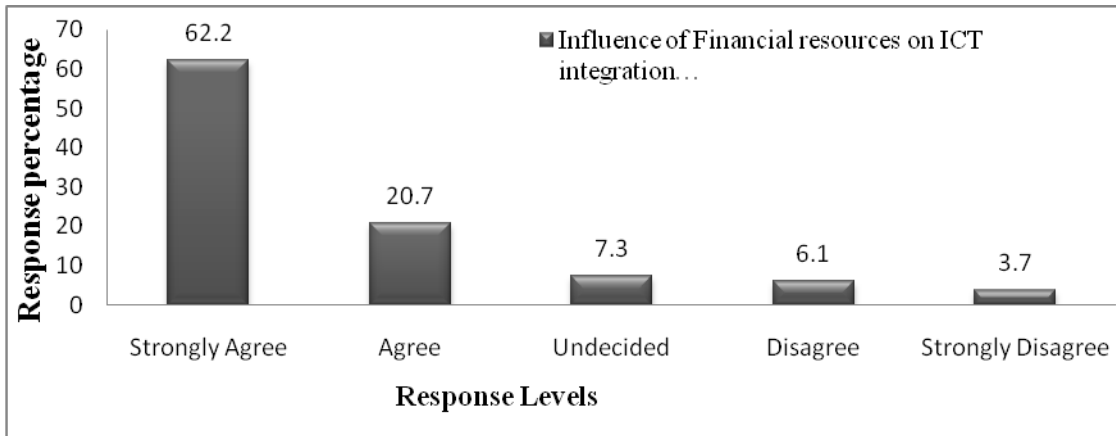


Figure 4. 2: Principals' Responses on Influence of Financial Resources on their Leadership in ICT Integration

Results in Figure 4.2 revealed that 51 (62.2%) principals strongly agreed, 17 (20.7%) agreed cumulatively giving 68(82.9%), 6(7.3%) undecided, 5(6.1%) disagreed and 3(3.7%) strongly disagreed (9.8%) that financial resources influenced integration of ICT.

According to principals, financial resources positively influenced principals' leadership in ICT integration in PSSM. A greater part of respondents (82.9%) cumulatively as explained above, argued that if there were adequate financial resources ICT integration would be made easier. Some observed "the school is still developing and without financial resources there isn't much I can do given that ICT in entirety is costly". This finding concurred with Kimuyu, Kalai and Okoth (2016) studies in which 100% of respondents affirmed that integration of ICT in PSS administration was constrained by inadequate financial resources to purchase ICT equipment. Financial resources are paramount in ICT integration to cater for TCO; however, from document analysis many of the sample schools hardly put into consideration TCO. It was established

through observation checklist that TCO was ignored as evidenced in some schools with adequate computers safely kept in a room for lack of room for teachers to use or access. A principal opined:

“I have 20 computers, a printer, a modem and photocopier in school but I neither integrate all in management nor distribute to sub systems like HODs, CTs, stores and even library to name but a few. A lot more needs to be put in place first only when financial resources are available”.

Conversely, 9.8% who disagreed in the current study asserted that with or without finances it depended on the immediate needs of the school. For instance, 3.7% of principals in nearly similar tones observed that even with weak financial muscle, there was integration in management to some level but priority was given to other pressing demands. This study finding corroborates with Miranji and Lelei (2017) finding where 80.4% of the respondents indicated that lack of funds to purchase up to date ICT facilities was to a great extent a challenge witnessed in use of ICT. This was further evidenced in a $MS=3.98$ which demonstrated that lack of funds to a great extent influenced integration of ICT in management.

4.6.1.2 Influence of Training on Principals’ Leadership in ICT integration

Figure 4.3 presents responses on Principals’ Responses on Influence of Training in Integration of ICT

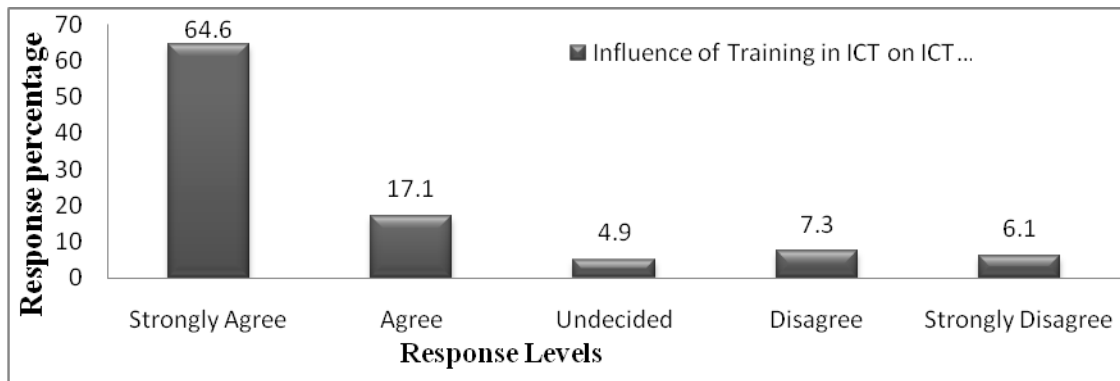


Figure 4. 3: Principals’ Responses on Influence of Training in Integration of ICT

Figure 4.3 illustrates principals' responses on influence of training on their leadership in ICT integration. On training factor, 53(64.6%) principals strongly agreed, 14(17.1%) agreed translating into 81.7% while 4(4.9%) Undecided, 6(7.3%) disagreed and 5(6.1%) strongly disagreed which formed a mere 13.4%.

Principals integrating any form of ICT in management associated integration with training to enhance effectiveness based on self efficacy. A bulk of respondents (81.7%) observed that training positively influenced principals' leadership for ICT integration while only 13.4% held divergent views. Earlier on in this study, it was noted that 63.4% of principals had no training in ICT hence had a negative influence on ICT integration in management tasks. Divergently, Musambai, Ndirangu and Mukhwana (2017) findings revealed that 71.4% of principals highest level of training was through experience. This meant that a popular group of respondents were not trained in computer which possibly influenced integration even with ICT grants. While the present study shares similar views that ICT training influenced desired outcomes in integration of ICT, some principals asserted:

“I don't have much ICT equipment to totally integrate in management besides, my teachers have no formal training but this has never stopped me from involving them in integration of ICT in management activities. They do it based on their informal training, peer support and they are good at it. To me training in ICT is not a question of life and death; it's the commitment and interest to do it and do it good that matters most”.

Training comes in where technical expertise is required otherwise a good number had hands on kind of experience. Evidenced from staff development policy documents pointed out that very few principals underwent formal training save for only 18.3% who went through workshop level which was inadequate with the ever new technologies in the market.

4.6.1.3 Influence of Administrative Support on Principals Leadership in ICT Integration

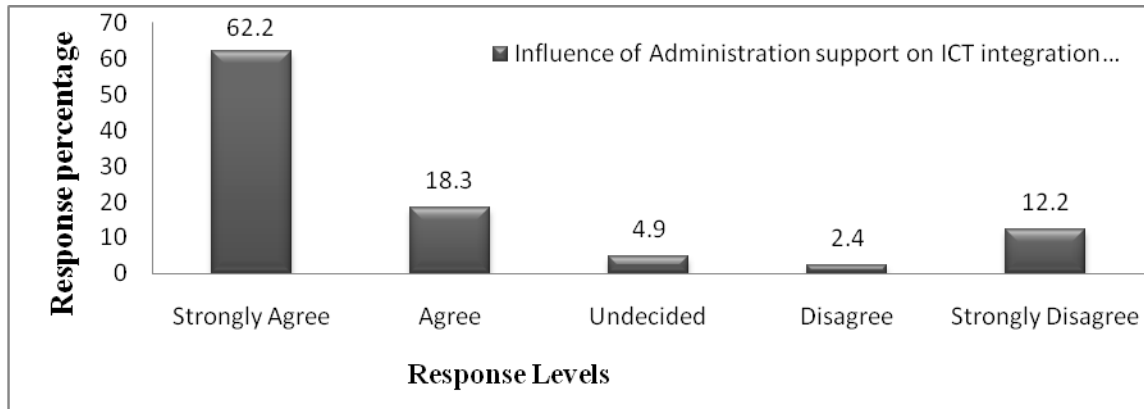


Figure 4. 4: Principals’ Responses on Influence of Administrative Support on their Leadership in ICT Integration

Figure 4.4 presents principals’ responses on the influence of administrative support on their leadership in ICT integration. There were 51 (62.2%) respondents who strongly agreed, 15 (18.3%) agreed which cumulatively added to 80.5%. At least 4(4.9%) were undecided, a dismal 2 (2.4%) disagreed while 10 (12.2%) strongly disagreed totaling to a mere 14.6%.

According to Figure 4.4, administrative support has a positive influence on principals’ leadership in ICT integration in PSSM. The administrative support in this case is two-way; from the MOE and other stakeholders to support principals’ leadership where they could provide either financial or material for integration in management. Musambai, Ndirangu and Mukhwana (2017) study findings established that 86% cited involvement of stakeholders in financing ICT infrastructure in schools as the appropriate strategy to improve ICT use in educational management. This kind of support is both to the school and the principal in integrating ICT. One principal observed:

“I always try my level best to offer administrative support to ensure ICT is adequately integrated in both management and curriculum. I always convince BOM through PTA vote head by hiring computer teachers and out sourcing of technicians to provide necessary support, repair and maintenance. Teachers have free access to Internet, as a school we sponsor teachers for training on basics in ICT and through SMASSE. We should hold conversations to address the narrative that principals do not need administrative support to enable them provide needed support to staff members”

This finding concurred with Papaioannuo and Charalambous (2011) study in Cyprus that principals too require support from MOE such as installation of management programs and technical support on repair and maintenance. Such support if not effectively addressed, efforts to integrate ICT were deemed to fail. Another principal observed:

“I have given up on external support on ICT for my school based on past experiences. Through the ESP, some schools were selectively given at least 10 computers, a laptop, printers and Internet connectivity among others. Through CDF the same schools benefitted from at least 15 computers while some of us have totally nothing and they know. Tell me why is this? Support towards ICT integration be it in management or curriculum should be uniform across schools because as we are talking, I never received a single device”

The principals' administrative support borders positive attitude towards ICT integration. To implement a program, it's incumbent upon the principal to hire personnel to support and manage ICT infrastructure in school. This requires principal and the larger staff to be knowledgeable in ICT matters given that ICT is an essential component in organizational management processes. Such principals were innovative in sourcing for resources to enhance integration. This support base provides an enabling environment for team work. Through observation checklist data it was revealed that some schools had enough computers but principals were not hands on to ensure every teacher used ICTs except for complains on lack of room and skills. This finding is supported by Nangue, Creunen and Church (2011) that MOE inadequately supported schools in ICT integration in Cameroon. Principals improve integration in management through self driven initiatives such as fund raising, SIGA and exploring several other avenues to obtain resources.

4.6.1.4 Influence of Internet Connectivity on their Leadership in ICT Integration

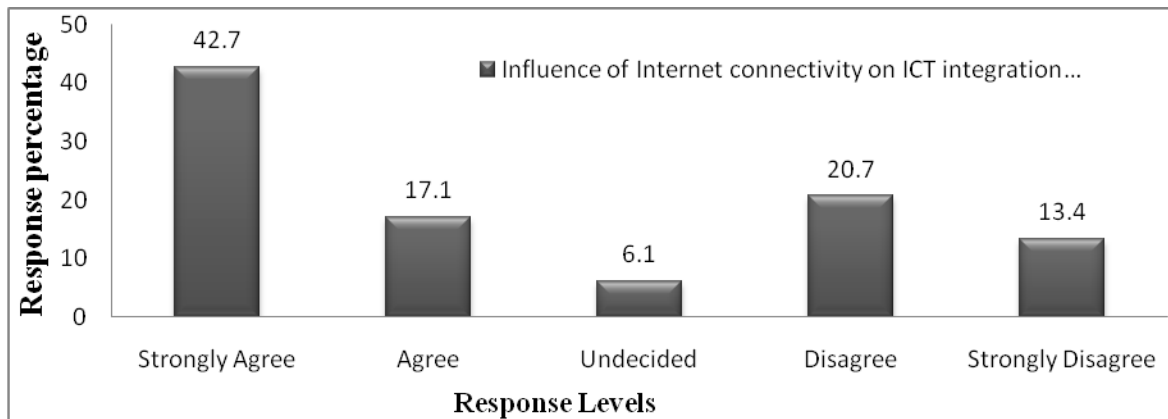


Figure 4. 5: Principals’ Responses on Influence of Internet Connectivity on their Leadership in ICT Integration

Figure 4.5 depicts principals’ responses on influence of Internet connectivity on their leadership in ICT integration. According to principals’ responses, 35(42.7%) Strongly Agreed, 14(17.1%) Agreed translating into 59.8% indicating positive influence, 5(6.1%) Undecided, 17(20.7%) Disagreed and 11(13.4%) Strongly disagreed among to 34.1% of those holding contrary views.

An enlightened school leadership has the command of technology in this digital era. In this study Internet connectivity positively influenced principals’ leadership in ICT integration in management as indicated by 59.8% of principals. Despite responses in the affirmative there were complaints of unreliable Internet connectivity and TCO implications. Data from observations checklist suggested dysfunctional Internet connectivity in many schools or none installation due to high costs and in considerations on TCO. A principal observed: “ I have ICTs but the most frustrating part of its usage is the Internet. Here Internet is just not workable and whenever we have intentions of using Internet services, we just do it in a cyber in town which really eats into our time and compromises confidentiality of documents”. It was further established in the ICT committee meeting and staff meeting minutes that Internet in the area was a great challenge.

While Damkor, Irinyang and Haruna (2015) concurred with this study, most schools in Nigeria were unable to have Internet connectivity because of high cost implications. On the contrary, Nyanchoka, Matula and Kalai (2015) findings indicated that in Isinya Sub County, 65% of schools had reliable Internet connectivity attributed to government support for better services through email and browsing.

4.6.1.5 Influence of Technical Support on Principals' Leadership in ICT Integration

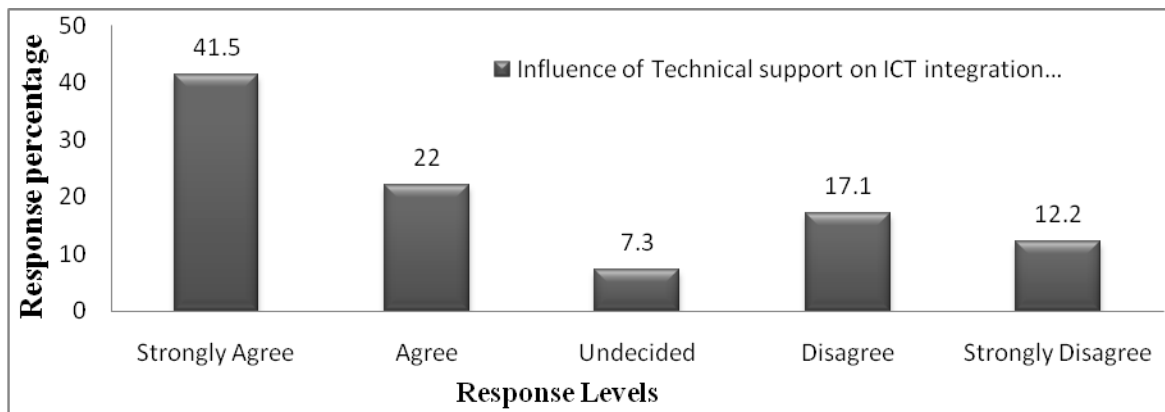


Figure 4. 6:Principals' Responses on Influence of Technical Support on their Leadership in ICT Integration

The results in Figure 4.6 presents principals' responses on the influence of technical support on their leadership in ICT integration. Results indicated that 34(41.5%) strongly agreed, 18(22.0%) agreed which amounts to 63.5%, only 6(7.3%) were undecided, 14 (17.1%) disagreed and 10 (12.2%) strongly disagreed adding to 29.3% who held contrary view.

The technical support variable on principals' leadership in ICT integration could not be over-emphasized. Respondents'(63.5%) views were convergent with Yilmaz (2011) assertions on Turkish education system that schools with hardware and Internet connections required technical support to oversee repair and maintenance for sustainability. A principal observed

“All our six computers and a printer broke down and we are yet to get a technician to repair. This has paralyzed our ICT services in management functions in my office, DPs office and accounts office yet very crucial areas. Hiring an ICT technician is surely expensive and if you negotiate for lower payment, they do a shoddy job”.

However, holding divergent views, 29.3% stated that technical support did not have an influence on ICT integration so long as strict ICT code of conduct was observed. This minimized virus and troubleshooting problems that discourage users for fear of equipment failure. Document analysis disclosed that schools hired less qualified technicians of certificate levels and in isolated cases diploma because of the high remunerations demanded.

4.6.1.6 Influence of Accessibility to Principals’ Leadership in ICT Integration

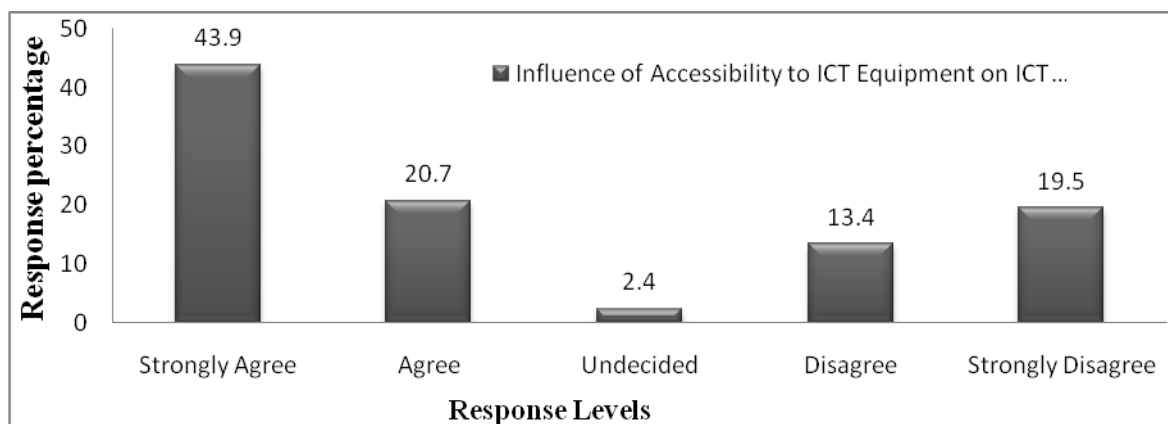


Figure 4. 7: Principals’ Responses on Influence of Accessibility in ICT Integration

Principals’ indicated that 36 (43.9%) strongly agreed, 17 (20.7%) agreed cumulatively adding to (64.6%), only 2(2.4%) were undecided, 11(13.4%) disagreed while 16(19.5%) strongly disagreed that access influenced ICT integration.

For effective integration of ICT, accessibility to ICT hardware and software are a requisite for convenience. Respondents (64.6%) held the view that accessibility to ICT devices positively influenced integration as it saved on time and enhanced teamwork. However 32.9% of

respondents dissimilar indicated that with or without access to ICTs, it all depended on the users' ICT knowledge and skills, attitude, interest and acceptability to change.

In some schools, personal cellphones were the only ICTs accessible while other ICTs were accessed from cyber cafes. Improved availability and access to ICT was associated with schools' affordability of such resources and vice versa hence digital divide theory. This finding concurred with Afshari *et al* (2010) findings that levels of access to ICT were significant in determining levels of ICT use in schools but disagreed that ICT accessibility means in schools. A principal from a fairly ICT endowed school observed:

“All teachers access computers and Internet when they individually entermarks in the computer and use the Internet at particular times in the presence of the computer teacher in the lab. The DPs and DOS each have a computer in their offices and if need be, CTs still accessed. All these have made the whole staff ICT savvy”.

From observation checklists, it was evident that no school had a computer per CT in the whole county however majority accessed those available in various subsystems in school or from other sources outside school.

4.6.1.7: Influence of Availability of Power Supply on Principals' Leadership in ICT Integration

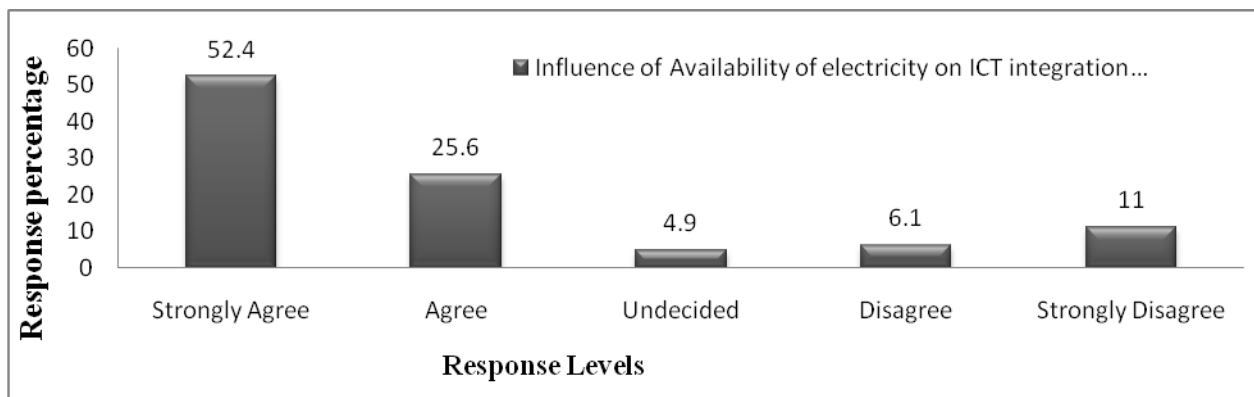


Figure 4. 8: Principals' Responses on Influence of Availability of Power on their Leadership in ICT Integration

Results presented in Figure 4.8 indicated that 43 (52.4%) principals strongly agreed, 21 (25.6%) agreed adding up to (78%) with the statement adding up to 78.0%, a paltry 4 (4.9%) were undecided, 5(6.1%) disagreed while 9 (11.0%),strongly disagreed which adds to 17.1% who stated that availability of power supply influenced principals' leadership for ICT integration.

With rural electrification, a big number of schools had power installed where 70.7% had functional electricity but the undoing was irregular supply characterized with power outages. The high percentage of electricity in schools was an indicator that with electricity, ICT integration was easy only and when required ICTs were available and accessible. On electricity one principal observed:

“I am aware that we don't have computers other than cellphones and flash disks in school but two of my teachers have laptops which have been assisting us. If we had electricity or even generators, this could conveniently be done in school but we can't afford given the demanding needs like physical infrastructure”.

The use of generators to power computers was costly hence the need for Kenya Power Limited to improve on regular and reliable supply. While few respondents did not find electricity as influencing ICT integration, acquiring ICT was most important. A respondent stated:

“I have had electricity installed in this school for now four years yet I don't have a single computer. I still outsource ICT services which is really inconveniencing and costly besides lack of confidentiality. Generators are damn expensive as my experience in this school before electricity installation is still fresh on my mind”

This observation did not resonate well with Nyenwe and Ishikaku (2012) findings that in the absence of power supply as the situation was in Nigeria, solar panels and generators would be an alternative source. Through document analysis and observation checklist, no sample school used

generators in palace of electricity. It was clear that availability of power alone would not facilitate integration of ICT as other variables such as finance and ICTs are paramount.

4.6.1.8: Influence of Time Resource on Principals' Leadership in ICT Integration

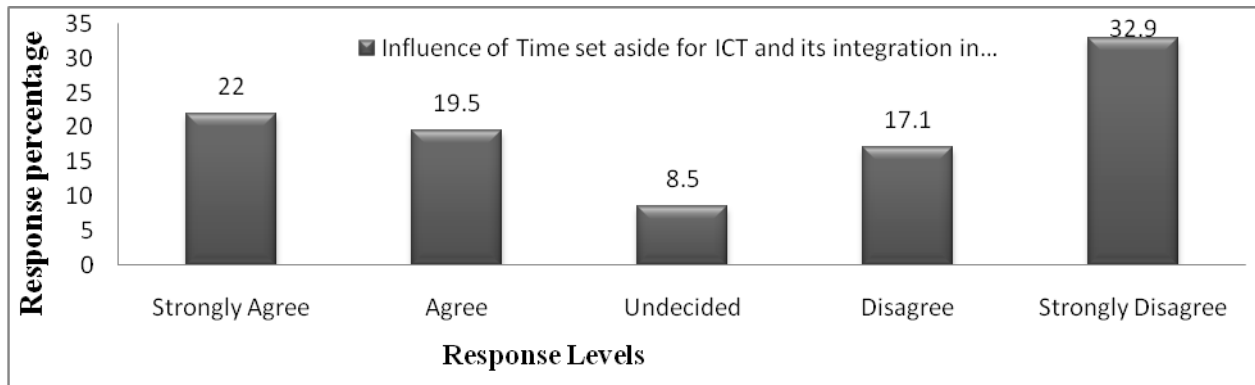


Figure 4. 9: Principals' Responses on Influence of Time on their Leadership in ICT Integration

The results in Figure 4.9 portray that time influenced Principals' leadership in ICT integration among activities carried out in PSS. The findings indicated that 18 (22.0%) respondents strongly agreed, 16 (19.5%) agreed translating into (41.5%), only 7 (8.5%) were undecided, 14 (17.1%) disagreed and 27 (32.9%) strongly disagreed amounting to (50.0%) that time factor had negative influence on ICT integration.

Some proponents of ICT integration put several factors as requisites for ICT integration at school levels. Principals in this study observed that teachers have adequate time to integrate ICT as time used for carrying out management activities through pen and paper could be replaced with ICT.

A principal asserted:

“Instead of writing when setting exams, they can use computers to type the same work, instead of coming to see me in office individually, they can send messages using their cellphones, call or use our Whatsapp wall (although we don't

encourage this), communicate with parents or guardians through text messages, voice call or email, enter students' marks in the computer directly instead of writing. It's doable so long as people change their attitude towards ICT".

Another principal indicated that through ICT and in this case use of a computer and management software, follow up of financial transactions and holding the accounts clerk accountable was simplified. This implied that the principal ensured that computers were in use at all times which saved time and this saved such principal time in solving parents' issues on finance. These were some manifestations that there was time and could be created to integrate ICT. On the other hand, some respondents observed that there was limited time due to understaffing hence too much workload with few available and functional ICTs. Document analysis data revealed that most Sub County schools commonly referred to as CDF schools were indeed understaffed.

One principal opined that even if there was time, the school had only one computer and a flash disk which couldn't serve all staff members. The time factor could be associated with staffing and accessibility to ICT hardware and software. This finding agreed with Kyalo and Nzuki (2014) on time as a limiting factor to ICT integration even with ICT competent and confident personnel. The duo's literature review focused on time in using ICTs for curriculum delivery contrary to this study which addressed time in the context of ICT integration in management.

4.6.1.9: Influence of Attitude on Principals' Leadership in ICT Integration

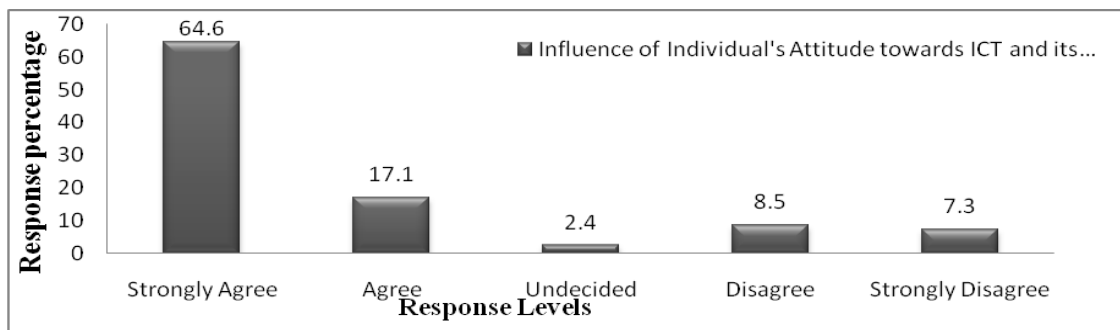


Figure 4. 10: Principals Responses on Influence of Attitude on their Leadership in ICT Integration

According to Figure 4.10, 53 (64.6%) principals Strongly Agreed, 14 (17.1%) Agreed giving a total of 81.7%, only 2(2.4%) were Undecided, 7(8.5%) Disagreed and 6(7.3%) Strongly disagreed amounting to 15.8% of those who disagreed.

The principals’ attitude on ICT provides muscle in integration of ICT in school activities. Principals (81.7%) opined that positive attitude calls for commitment to overcome barriers be it accidental or incidental. Minority(15.8%) stated that negative attitude was an undertone signifying resistance to change and failure to spearhead integration by providing hardware and software as a form of support. The complexities, lack of external support and economic constraints schools face was enough reason to develop negative attitude towards ICT integration in school management. Such define world apart in ICT integration in PSS in Bungoma county. In document analysis, it was established that the idea of attitude towards ICT integration was discussed meaning some negative energy was dragging the process of integration. Conversely, Musambai, Ndirangu and Mukhwana (2017) study established that 47.6% of principals cited negative attitude as influencing quality of educational management in PSS.

4.6.1.10: Influence of Age on Principals’ Leadership in ICT Integration

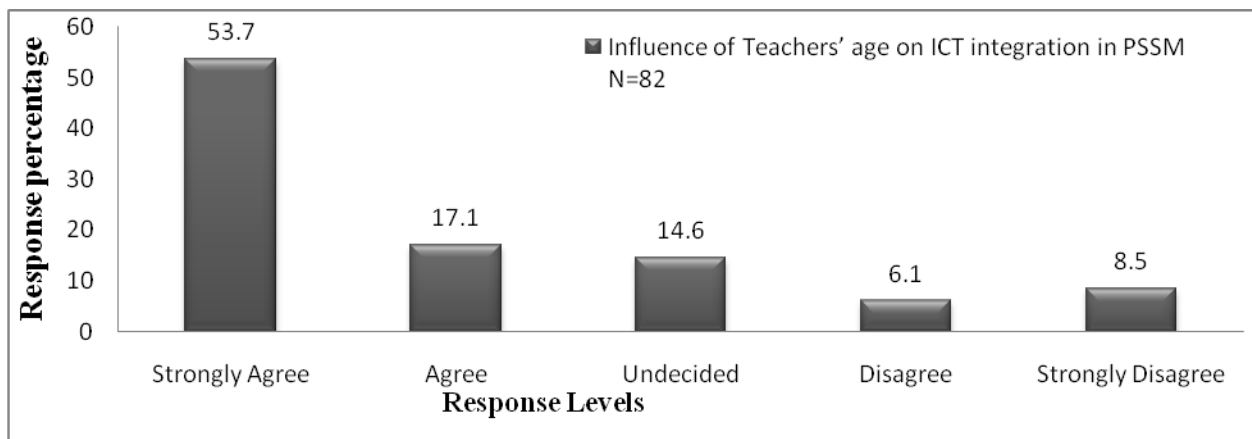


Figure 4. 11: Principals’ Responses on Influence of Age on their Leadership in ICT Integration

The results on the influence of age on principals' leadership in ICT integration revealed that 44 (53.7%) principals strongly agreed, 14 (17.1%) agreed amounting to (70.8%) that age had a positive influence, 12 (14.6%) undecided, 5(6.1%) disagreed and 7(8.5%) strongly disagreed adding to (14.6%) indicating age has negative influence.

A slightly below average percent of 42.7% of principals were below 50 years of age implying they could consider ICT integration based on the premise that introduction of ICT was close to their age bracket. A principal observed “Although I have not seen so much of a problem regarding age and ICT integration, sometimes the older staff members submit work late. However, the few in their 30s are sharp in integration and do assist us so much”. Age and ICT could easily take different directions. This study was in agreement with Makhanu and Kamper (2010) where moderate association between principals' age and ICT literacy was established.

4.6.1.11: Influence of Operating Rooms on Principals' Leadership in ICT Integration

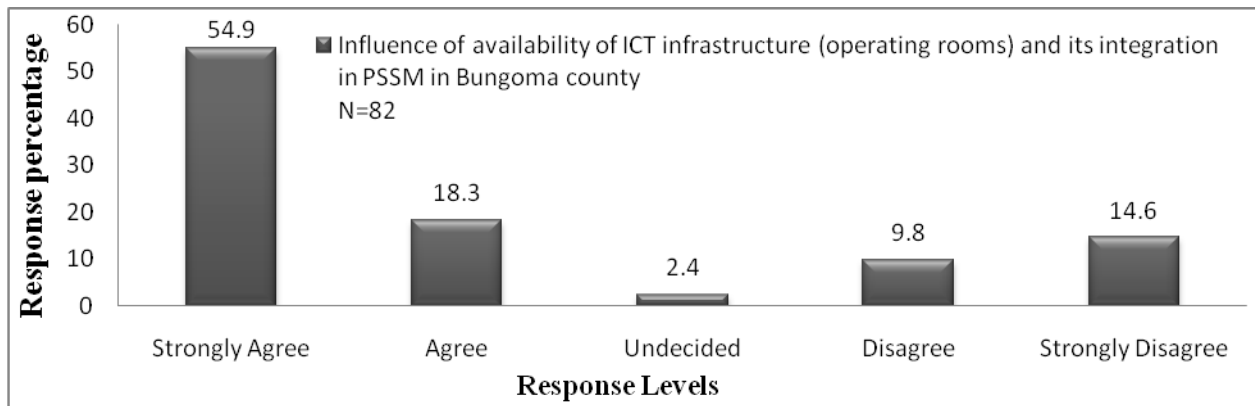


Figure 4. 12: Principals' Responses on Influence of Room on their Leadership in ICT Integration

The role of operating room to integrate ICT could not be over-emphasized. From principals responses, 45 (54.9%) strongly agreed, 15 (18.3%) agreed which amounts to (73.2%), then

2(2.4%) undecided, 8(9.8%) disagreed while 12(14.6%) strongly disagreed giving a total of 24.2% disagreeing.

The respondents observed that there was need for room to enable integration in management but due to acute shortage of rooms; it was rather difficult for integration even where ICTs were available. From observation checklist, 4.9% of schools had more than 30 computers but teachers couldn't access for lack of room as they oscillated between the staffroom and congested classrooms. Evidence to this can be seen from plates 1A and 3 that have been attached in Appendix N. A principal observed "I have 15 functional computers heaped somewhere for lack of room however, only the secretary, accounts office and DOS squeeze themselves in their working rooms to use. Teachers set handwritten exams and forward to secretarial pool, very tedious". Another observed "room may not necessarily influence integration, if I had basic ICTs, all teachers would do their stuff but I don't have any". This implies principals leadership commitment to ICT integration varies from one to another.

4.6.2 Deputy Principals' Responses on Factors Influencing Principals' Leadership in ICT Integration

The respondents were provided with a questionnaire seeking to determine their level of agreement on factors influencing principals' leadership in ICT integration and a 5-point Likert scale was adopted where 1 = *strongly disagree*, 2 = *disagree*, 3 = *undecided*, 4 = *agree*, 5 = *strongly agree*. The Mean Score (*MS*) and Standard Deviation (*SD*) on each item on the scale was interpreted to measure whether respondents were in disagreement, neutral or agreement on each item (Table 4.10).

Table 4. 9: Interpretation of Mean score on Likert Items

Meanscore	Interpretation
1.0 – 2.49	Disagreement
2.5 – 3.49	Neutral
3.5 – 5.0	Agreement

Source: Goos and Meintrup (2015)

4.6.2.1 Descriptive Statistics on DPs’ Responses on Factors Influencing Principals’ Leadership in ICT Integration

The DPs’ responses on factors influencing principals leadership in ICT integration were as illustrated in Table 4.11. The DPs’ responses where *MS* was rounded up to two decimal point revealed that Internet connectivity had a mean score of 3.86, technical support (*MS*=4.20), access to ICT equipment (*MS*=3.67), time resource (*MS*= 4.07), attitude towards ICT integration (*MS*=4.03) and room to integrate ICT (*MS*= 3.20).

Table 4. 11: Descriptive Statistics Results of DPs’ Response on Factors Influencing Principals’ Leadership in ICT Integration

Factors	Scores on Individual Items				
	<i>N</i>	Minimum	Maximum	Mean	Std. Deviation
Financial resources	212	2.00	5.00	2.92	.89885
Training in ICT	200	1.00	5.00	2.16	.93206
Administrative support	209	1.00	5.00	3.09	1.37853
Internet Connectivity	210	1.00	5.00	3.86	1.21197
Technical support	212	1.00	5.00	4.20	1.00633
Access to ICT equipment	212	1.00	5.00	3.67	1.22549
Power supply	212	1.00	5.00	2.03	1.10314
Time resource	212	1.00	5.00	4.07	1.03282
Attitude towards ICT	212	1.00	5.00	4.03	1.07705
Teachers’ age	212	1.00	5.00	2.23	.84784
Room to integrate ICT	212	1.00	5.00	4.00	1.10791
Average Mean				3.30	

Finance is a critical component in the implementation of any school program or project and more often than not requires principals’ leadership and commitment. Observation checklist data

confirmed that most DPs' offices were not well equipped with ICT due to what was perceived as school financial constraints. Data from document analysis such as BOM, PTA and staff meeting minutes depict that financial resources were essential in initiating and sustaining ICT integration with considerations on TCO however complimentary factors like attitude towards ICT integration and administrative support were paramount. At most school desktop computers, individual laptops and cellphones were found in the DPs offices. Availability of adequate funds would facilitate relevant infrastructural changes, safeguard equipment, ensure staff development and hiring of qualified ICT technicians under the principle of TCO. However, data from interview schedules, indicated that ICTs were reported as costly and most schools were operating on weak budgets with pressing priorities coming first. The DPs could be forgiven for simply standing safe grounds on school finances and possibly being in the dark of what happens. This was partially supported by Mue, Itegi and Kyalo (2014) indicating that DPs were not conversant with school financial administration since the docket was managed by principals and accounts department. The respondents were neutral on the questionnaire item regarding financial resources as influencing principals' leadership in ICT integration as illustrated ($MS= 2.92$; $SD=0.89885$) that some respondents were undecided on the item.

Training in ICT related programs provides teachers with knowledge and skills and self-efficacy for ease and effective integration. A 53.3% of DPs had workshop level of training (Table 4.4) contrary to Mwikya and Lelei (2017) assertion that respondents were able to use computers even with less advanced skills in ICT. According to Edward, Matula and Kalai (2015) findings, 64% of principals had certificate level of training in ICT yet principals with high levels of knowledge in this field were capable of integrating ICT in school management. Data from interview schedules revealed that school staff acquired ICT knowledge and skills informally through

hands-on training and teamwork which again qualifies why DPs did not find training as significant. It is important to note that without training some fears were evident regarding accuracy of work which corroborates with Oguta, Egessa and Masiega (2014) findings where 60% of schools did not integrate ICT in accounts because of the unskilled staff. The DPs were in disagreement on the item training influenced principals' leadership in ICT integration as indicated ($MS= 2.16$; $SD=0.93206$). The SD suggested that there was a low variation in responses which possibly emanated from pros and cons of either formal or informal training in ICT.

Administrative support plays a key role in integration of ICT in management activities in the DP's office as it provides an enabling environment for team work. Administrative support at various levels is guided by the knowledge and attitude of the principals' leadership. Principals' leadership support in provision of appropriate ICT facilities and related infrastructure enhances effective application of ICT in administration. What is least addressed is the fact that principals too need administrative support to optimize integration in management functions. Document analysis data revealed that principals were required to provide administrative support in DPs office with regard to ICT integration, by giving them leeway to access any ICTs available in schools for professional work. Nonetheless, observation checklist data revealed that in terms of availability of ICT equipment in DPs office, administrative support was skewed towards DOS office. Musambai, Ndirangu and Mukhwana (2017) assertions indicate that PSS in Kakamega County received support from MOE where in 2011 through the ESP a grant of Ksh. 877,500/ was provided to 45 PSS towards purchase of ICT equipment to improve on efficiency and effectiveness in management. This study was divergent from Waweru and Gitumu (2014) findings that 53.8% of principals were not supportive of ICT programs in PSS in Kahuro District, Kenya where a weak relationship between school management and ICT integration (r

=.403) was demonstrated. Even though DPs were neutral on administrative support item($MS=3.09;SD =1.37853$) for perhaps playing safe.

Internet connectivity is valuable in connecting people to the world over. In this study, Internet connectivity was dysfunctional as a result of high costs in installation and maintenance besides regular electricity interruptions. Despite Internet connectivity issues, principals allowed DPs to access Internet services in schools where it was available and functional. Some principals opined “ Our DP is allowed to access the Internet and whenever it failed, the school modem is on standby for the same purpose. Sometimes if need be, we facilitate for cyber café services”. This resonates well with Nangue, Creunen and Church (2010) study in Cameroon, which indicated that 54.3% of teachers accessed Internet in cyber cafes, 25.7% accessed at schools and 20% accessed at home. Nyanchoka, Matula and Kalai (2015) study findings diverged indicating that 65% of schools had available and reliable Internet connectivity in Isinya sub County, Kajiado County, Kenya. Document analysis data confirmed that schools with highest number of modems were usually used by school secretaries and DOS and rarely by DPs. This study corresponded with Mwikya, Imonje and Mugambi (2014) study where 58.8% of schools relied on prepaid modems and 6% on Internet server in Migwani District, Kitui County, Kenya. The DPs’ were in agreement that Internet connectivity influenced principals’ leadership in ICT integration as portrayed ($MS= 3.86;SD= 1.21197$) which was suggestive of high number of responses were in agreement on the item Internet connectivity.

Technical support has a huge place in technology that is characterized by complexities in its use and based on varied staff levels of self efficacy in ICT. Document analysis data from ICT committee, staff, BOM and PTA meeting minutes revealed that technical support influenced their leadership in ICT integration. For instance schools lack adequate funds to hire a qualified

technician and instead sought for cyber services or consulting with experts. this had demerits in terms of confidentiality of school documents and also as costly. Data from observation checklist confirmed that technical support in schools was ineffective especially where most ICTs were dysfunctional yet repairable. This finding was inconsistent with Kimuyu, Kalai and Okoth (2016) study which revealed that 57.1% of schools did not have an ICT technician as most principals preferred outsourcing services than hiring which was described as least cost effective while others relied on teachers of computer. For instance, Nyanchoka, Matula and Kalai (2015) study established that majority of schools relied on teachers of computer (60%) while a minority (40%) hired ICT technicians. This implied that principals were not keen on hiring ICT technicians and relied on teachers' knowledge and skill base in the field. Nangue, Creunen and Church(2010) study further indicated that 85.4% of teachers were unable to use computers for lack of technical support which reinforces the need for school management to consider hiring ICT technicians. The DPs were highly in agreement that technical support influenced principals' leadership in ICT integration in their offices as reflected($MS= 4.20$; $SD=1.00633$). This portrayed that DPs were more in agreement over technical support item as having an influence on principals' leadership and ICT integration in DPs office.

Principals' leadership determine user accessibility to ICT in an institution. Nearly all DPs contend that accessibility to ICT equipment in their offices depended on principals' leadership in ICT integration in terms of usability. This argument was guided by data from observation checklist which demonstrated that national, county and sub county schools were at different levels when it comes to accessing ICTs. Swarts and Wachira, (2010) observed that in Tanzania, accessibility was limited by shortage of hardware and software plus poor Internet connectivity based on government ICT infrastructure implying that while principals could be working hard to

integrate ICT, the situation was beyond their capability. In spite of the issues experienced, document analysis data illustrated principals' willingness to integrate ICT was impeded by inadequacy of rooms and weak financial muscle especially in sub county schools. The dynamism in technological advancement today, requires principals' to ensure ICTs are updated now and then to avoid incompatibility. The DPs' responses indicated that a greater part of them were in agreement that accessibility influenced principals' leadership in ICT integration in DPs office($MS= 3.67;SD=1.22549$).

Power supply and in this case electricity is a requisite to ICT integration. The advent of rural electrification in Kenya led to installation of electricity in most PSS in Bungoma county. This study findings established through interviews and observation checklist data that electricity as a valuable infrastructure in 61.3% was functional save in isolated cases which were still in the process of installation. It was further established that no school depended on either generator or solar panel as alternative source of power especially with regard to ICT integration. Although electricity as source of power for ICT integration registered good progress in PSS in Bungoma County, in Laaria (2013) study, 34.44% of respondents cited electricity as limited and unreliable source of power. Conversely, data from interviews and document analysis depict electricity as occasioned by frequent outages that adequately influenced principals' ICT integration. While Muriko, Njuguna and Njihia (2015) study was in agreement with the present study, they observed that although 100% of PSS in Kiambu County had adequate supply of electricity, 85% cited lack of generators to serve as backup in case of power outage as 15% had generators as backup. Conversely, data from interview schedule, document analysis and observation checklist indicated that no school in Bungoma County depended on either generator or solar panel as alternative source of power to facilitate ICT integration despite regular power outages. This

finding pointed out that($MS= 2.03$; $SD=1.10314$) respondents were in disagreement with power supply item as influencing principals' leadership in ICT integration in DPs' office.

Time is a valuable resource in any institution for successful running of activities and principals in their leadership skills must be good time managers. Through interview schedule and document analysis, there was a concern on understaffing which naturally leaves staff with overwhelming workload and even with competent and confident teachers, ICT integration was minimal because of inadequate time. The idea of time again greatly affected DPs in schools without ICTs on material search, lesson preparation and other management functions. With frequent power outages, Laaria (2013) opined that ICT users would require more time to patiently wait for power reconnections or technicians to guide the less techno savvy. Similarly, even with time but with inadequate or lack of ICT equipment, without administrative support for accessibility and staff development, there was definitely less ICT integration. Document analysis data indicated that principals encouraged staff to embrace ICT by spending time practicing how to use. The study established high agreement ($MS=4.03$; $SD=1.033$) on the item time resource as influencing principals' leadership in integration of ICT in DPs office.

Attitude cuts across school leadership and staff destined to integrate ICT in management activities. As Kimuyu, Kalai and Okoth (2016) would argue, principals with positive attitude towards ICT would be motivated to integrate ICT in administrative tasks and vice versa. The trio went ahead to observe that some principals termed use of text message for communication as unofficial and described as negative attitude while principals with positive attitude were self motivated to integrate ICT in management. In the same breath, Nyanchoka, Matula and Kalai (2015) posit that majority of principals (62%) with positive attitude were skewed towards ICT use in administrative tasks than negative (15%). However, it's only prudent that we affirm

attitude as twofold, both positive (enable) and negative (disable) cutting across principals' leadership and staff destined to integrate ICT in management activities. The principals demonstrated positive attitude towards ICT integration in the way they provided support and initiated ICT integration in management tasks in schools. This view was supported by document analysis data that teachers were sensitized on how to integrate ICT in management activities by a computer supplier namely CAMARA. The study established that majority of the respondents ($MS=4.03$, $SD=1.07705$) were highly in agreement with the statement attitude influences principals' leadership in ICT integration in DPs' office.

Integration of ICT in school management especially in developing countries like Kenya is considerably new. In this study DPs fell in the age bracket of 40- 44 (39.6%)while principals were in the age bracket of 45-50 (43.7%) according to data in(Table 4.3). The age bracket for principals and DPs concur with earlier studies indicating that 41-50 age bracket was associated with both principals and DPs which was believed to affect teachers' perceptions and use of ICT in management (Mutisya, Mulwa & Mwanja, 2017). However, respondents were in disagreement with age of teachers as influencing principals' leadership in ICT integration ($MS=2.23$; $SD=0.84784$). This finding corroborates with Adebisi-Caesar, Offei and Donte (2012)assertions that age did not influence principals ICT integration in DPs' office although 9.9% had a contrary view.

By nature ICTs are perceived as expensive and therefore would by all means require a safe room where they can be used. This findings revealed that operating rooms where ICTs are installed for integration in school management functions was a grave area of concern in nearly all schools. The ICTs are usually delicate and costly both in acquisition and maintenance meaning they need to be well safeguarded for integration in management tasks. Principals in their leadership are

required to be innovative enough to provide room for ICT integration. While the current study viewed room in the context of usability with ICT equipment, Muriko, Njuguna and Njihia (2015) study established that 16.6% of respondents cited lack of room as a challenge towards acquiring and maintaining ICT infrastructure because of the insecure environment. According to the present study findings, data from observation checklist and document analysis established that although other factors would influence integration, operating room influenced principals' leadership in ICT integration in DPs office. This was portrayed in schools where functional ICTs were stored in a safe room rather than put to use and congested staffrooms to accommodate the available ICTs and in some cases DPs shared a room with either the principal or DOS. The DPs were neutral ($MS= 4.00$; $SD=1.10791$) with the statement room to operate ICT as influencing principals' leadership in ICT integration.

4.6.2.2 Regression Analysis of DPs' Responses on Factors Influencing Principals' Leadership in ICT Integration

To determine whether there were statistical relationships between selected factors already presented under descriptive statistics and principals' leadership in ICT integration, data from DPs were subjected to regression analysis as presented in Table 4.11. The regression results indicate that there is a significant relationship between independent variables; administrative support, technical support, access to ICT equipments, time resource, attitude towards ICT and operating room to integrate ICT and integration of ICT in management tasks in DPs' offices. This was evidenced by their statistically significant correlations at 95% confidence level. Similarly with an adjusted R-squared as 0.8543, 85% of the variation in ICT integration in management tasks in DPs office was collectively attributed to the influence of the selected factors. These results portrayed that an increase in administrative support by .30719, technical support by .33459, accessibility to ICT equipment by .03685, an improvement in time

management by .0161326, change in attitude by .96405 and improvement on access to rooms for ICT integration by .0116189 would influence a positive change in ICT integration in management tasks in DPs office by over 1%. Furthermore, the findings indicated that there was a large effect size as evidenced by Cohen's $f^2 = \frac{R^2}{1-R^2} = \frac{0.8627^2}{1-0.8627^2} = \frac{0.74425}{0.25575} = 2.91$. These values according to Cohen, (1988) and Cohen (2013), implies that the listed factors in regression equation greatly influenced Principals' Leadership in ICT Integration in DPs office.

Table 4. 10: Regression Analysis of DPs' Responses on Factors Influencing Principals' Leadership in ICT Integration

Model summary						
Model	R	R ²	Adjusted R ²		Standard error estimate	
1	.9288	.8627	.8543		0.1826	
Details of regression						
Factor	Beta-coefficient	Std error	t	p-value	Critical values for 95% C.L.	
					Lower bound	Upper bound
Financial resources	-.0323204	.0439777	-0.73	.463	-.1191018	.054461
Training in ICT	-.0017718	.0350317	-0.05	.960	-.070900	.0673565
Admin. support	.3071909	.1278471	2.40	.017	.0549095	.5594722
Internet Connectivity	.0519085	.1154348	0.45	.653	-.1758797	.2796966
Technical support	.3345914	.1627507	2.06	.041	-.6557482	-.0134346
Access to ICT equipment	.0368502	.0139803	-2.64	.009	-.0644376	-.0092628
Power supply	.0188272	.0302115	-0.62	.534	-.0784436	.0407893
Time resource	.0361326	.0229246	0.70	.003	-.0291047	.0613699
Attitude towards ICT	.9640519	.0509522	18.92	.000	.8635077	1.064596
Teachers' age	.0275166	.0743312	0.37	.712	-.1191616	.1741948
Room to integrate	.316189	.1370537	-0.08	.003	-.2820679	.25883
(constant)	.1338366	.1232641	1.09	.279	-.1094011	.3770742

Regression equation/Model

$$Y = .1338 + .307AS + .3346TS + .0369ICT \text{ Access} + .0161TR + .9641Attitude + .0116Room$$

Where Y=ICT Integration in PSSM

AS=Administrative Support

TS=Technical support

ICT Acc=Access to ICT equipments

TR=Time resources

Room=Room to integrate

The current study revealed that there was a moderate effect and significant relationship between administrative support and principals' leadership in ICT integration ($\beta=0.3072$; $p=.017$) implying that a unit increase in administrative support would cause an increase of 0.3072 in the integration of ICT in management activities in the office of DP (Cohen, 2013; 1988). Further, a moderate effect of technical support on principals' leadership in ICT integration was noted ($\beta=0.3346$; $p=.041$), which implies that a unit increase in technical support would trigger an increase of about 0.3346 in ICT integration in management tasks in DPs offices. Also, the study established a large effect of accessibility on principals' leadership ($\beta=0.3685$; $p=.009$) implying that a unit increase in accessibility to ICT equipment would lead to an increase of about 0.3685 in ICT integration in management duties in DPs office.

The present study established that there was a large effect of time resource on principals' leadership in ICT integration ($\beta=0.361326$; $p=.003$) indicating that an increase in availability of time would increase by 0.36131 on ICT integration in management activities in DPs' office. However, Makhanu and Kamper (2010) asserted that there was a statistically non significant weak positive relationship ($p=.05$) between a principals lack of time to learn ICT literacy skills and school performance which according to them, principal's lack of time to learn ICT literacy skills was not associated with good leadership performance which in effect played a dismal role.

This study indicated that attitude was a strong predictor of principals' leadership in ICT integration ($\beta=0.9641$; $p=.000$) which implied that it is the single most important factor in ICT integration in management activities in DPs' office. This finding was corroborated by Kimuyu, Kalai and Okoth (2016) study which revealed that principals positive attitude towards ICT

integration had significant ($p=.05$) effect on ICT integration in PSS. The trio went ahead to describe positive attitude as a motivating factor towards ICT integration in administrative tasks.

A linear regression established that there was a moderate effect of operating room on principals' leadership in ICT integration ($\beta=0.3162; p=.003$) which implies that an increase in operating room establishment for ICT integration would lead to upward levels of 0.3162 in ICT integration in management tasks in DPs office.

The results demonstrated that there was no significant relationship between financial resources and principals leadership in ICT integration despite having indicated moderate effect ($\beta=0.323204; p=.463$). The study by Waweru and Gitumu (2014) assertion that there was a very weak positive correlation $r=.287$ between financial resources and ICT integration implied that financial resources had low impact on ICT integration. However, financial resources may not be an issue *per se* but its management to support ICT integration.

With regard to training, the study demonstrate that it had as mall effect on principals' leadership in ICT integration ($\beta=0.0017718; p=.960$) in management tasks in DP's office.

The DPs' responses depict no significant relationship and effect of Internet connectivity on principals' leadership in ICT integration ($\beta=0.0519085; p=.653$) in management tasks. Internet connectivity did not influence principals' leadership in ICT because from interviews, it was observed that Internet services were mostly outsourced or accessed through modems. This implies that even without Internet connectivity in DPs office, with available ICTs, integration of ICT would still be performed.

The regression results indicated that power supply had small effect and insignificant on principals' leadership in ICT integration ($\beta = 0.188272; p = .534$) in management tasks in DPs' office. This could be attributed to the fact that even with inadequate supply, integration of ICT in management activities was not guaranteed as there were other inhibiting factors like financial resources, availability of ICTs, accessibility and training among others.

The DPs responses on the item age of the teachers revealed that there was insignificant relationship despite having large effect on principals' leadership in ICT integration ($\beta = 0.743312; p = .712$) in the office of the DP managerial activities. Earlier on this study established that, most principals and DPs were within the age bracket to be motivated or develop interest in ICT integration as a contemporary tool of trade in management. This study nonetheless was inconsistent with Robinson and Judge (2010) survey on age of individuals and embracing technology in which they opined that millennials would readily embrace technology in diversity than the older in age.

4.6.3 Director of Studies' Responses on Factors Influencing Principals' Leadership in ICT Integration

4.6.3.1 Descriptive Statistics on DOS Responses on Factors Influencing Principals' Leadership in ICT Integration

The DOS responses on factors influencing principals' leadership in ICT integration in their office were as in Table 4.12. Major observations from DOS responses rounded up to MS to two decimal points were administrative support ($MS = 4.22$), Internet connectivity ($MS = 4.07$), technical support ($MS = 4.40$), time resource ($MS = 4.11$) and attitude towards ICT integration ($MS = 4.07$).

Table 4. 11: Descriptive Statistics Results on DOS' Responses on Factors Influencing Principals' Leadership in ICT Integration

<i>(n=106)</i>					
Scores on Individual Items					
Factors	N	Minimum	Maximum	Mean	Std. Deviation
Financial resources	106	1.00	5.00	2.76	.85980
Training in ICT	102	1.00	5.00	2.58	1.07571
Administrative support	105	2.00	5.00	4.22	.94035
Internet Connectivity	105	1.00	5.00	4.07	.97336
Technical support	105	1.00	5.00	4.40	.82741
Access to ICT equipment	106	1.00	5.00	3.91	1.01913
Power supply	105	1.00	5.00	2.68	1.15605
Time resource	106	2.00	5.00	4.11	1.03575
Attitude towards ICT	105	1.00	5.00	4.07	1.10303
Teachers age	106	1.00	5.00	2.57	.99541
Room to integrate	106	1.00	5.00	3.06	1.43978
Average Mean				3.49	

The school working capital to adhere to TCO with regard to ICT integration in management activities has had an influence on principals' leadership in ICT integration. Data from document analysis revealed that financial constraints interfered with principals' leadership in the smooth integration of ICT in schools. Further some ICTs in DOS office like computers, scanner, printers and photocopier were acquired through principals outsourcing skills. To this end, principals employed resourcefulness and innovativeness to raise funds towards ICT integration in school subsystems where the office of the DOS was the main beneficiary. This study concur with Mutysia, Mulwa and Mwanja (2017) observation that financial constraint was one of the major school related factors influencing principals' in ICT integration in school management as indicated by principals (56%) and teachers (44%). To strengthen this argument, the current study agreed with Adomi and Kpangban (2010) finding that application of ICT in Nigeria was low due to high cost of ICT facilities and low budgetary allocation which insignificantly influenced ICT application. The DOS were neutral on the statement financial resources influenced principals'

leadership in ICT integration ($MS= 2.76$; $SD=.85980$) implies that respondents were neutral on the premise that finance department is a preserve of the principal and accounts department.

Earlier on in this study, demographic information revealed that most DOS (64.2%) had ICT training at workshop level which means that they fairly understood the role of training in ICT integration. Training instills self efficacy and competency while lack of it creates fear of equipment breakdown or fear of the unknown. Wanjala; Khaemba and Mukwa (2011) observed that effective technology implementation requires adequate teacher training to confidently integrate ICT in professional operations. However, Unluer, *et al*(2010) findings indicated that although training opportunities were a hindrance to ICT integration, on-the-job professional development was advocated for. This implied that formal training was not the in thing *per se* but the alternative way of skills acquisition applied too. While this study was in convergence with Unluer *et al* (2010), the DOS were neutral($MS=2.58$; $SD=1.07571$) that training influences integration of ICT in their office in management tasks. This signifies the importance of knowledge and skill acquisition to integrate ICT and not how they are acquired or the process.

Administrative support is a must embrace practice for principals' leadership to integrate ICT in management activities as principals leadership is relied upon. Implementation of programs or projects in schools requires support of sorts for the school and from school management for success to be realized. Similarly, the integration of ICT is begged on administrative support in terms of staff development, infrastructural provisions and access alongside technical support. Similarly principals' leadership variously requires support from stakeholders like MOE, BOM and sponsors among others in form of either financial, equipment or human resource to integrate ICT. This finding was in convergence with Katulo (2009) study which established that through the MOE, schools received computers while NETSS supported case study schools in computer

maintenance. This kind of support was not by chance but principals must demonstrate their leadership by providing and or seeking for it. Data from document analysis reported that principals sought support towards ICT integration in the office of DOS from various organizations through proposal writing, fundraising or virement as a form of innovativeness. A good number of DOS were in agreement ($MS=4.22$; $SD=.94035$) that administrative support influences principals' leadership in ICT integration in their office which that implies there was insignificant variation in some responses.

According document analysis, the office of the DOS required Internet connectivity more based on the activities carried therein like registration and confirmation of KCSE candidates and scanning of documents, online communication and linkages both locally and globally through email and website among others. Despite the high positivity on the need for Internet connectivity, data from observation and document analysis revealed that most schools had Internet connectivity issues ranging from non connection, poor connectivity networks, maintenance costs, power outages. This study was divergent from Nyanhoka, Matula and Kalai (2015) assertion that 65% of the schools against 35% had Internet Connectivity in Isinya Sub County. Conversely, data from interviews reported that Internet services were easily accessible through cellphones (smartphones) or modems as options which partly concurred with Makhanu and Kamper (2012) study that 84.0% of principals accessed Internet and email services but through wireless and cellphones. The respondents were highly in agreement ($MS=4.06$; $SD=.97336$) with Internet connectivity as influencing principals' leadership in ICT integration.

The complexity of technology requires technical support to manage troubleshooting issues especially in cases of less techno savvy staff. This study aligned with Musambai, Ndirangu and Mukhwana (2017) study that 61.9% of principals and 49.3% HODs agreed that technical support

was a challenge though significant in ICT integration. For this reason, principals' leadership have a duty to consider providing qualified technical support for purposes of ICT maintenance. Data collected from document analysis indicated that most schools hired certificate level holders besides outsourcing sources due to high remunerations associated with the highly qualified technicians. The responses stand for high agreement ($MS= 4.40$; $SD=.82741$) that technical support influences principals leadership in ICT integration.

Accessibility to ICT equipment is an important factor that enhances integration and limits excuses on why integration was taking place. Through observation checklist, it was observed that despite adequate ICT devices in some schools, accessibility turned out to be a barrier to ICT integration. This finding concurred with Afshari *et al* (2010) that accessibility to computers in both developing and developed countries in efforts to enhance ICT adoption was a problem. For instance, Muchiri, Ndirangu and Kanori (2014) asserted that DPs (80%) and HODs (85%) could not access computers (80%), Internet (80%, 80%) and Printers (60%, 72%) respectively. It is prudent to note that accessibility to ICT equipment in the office of the DOS was determined by principals' leadership to support the idea. The findings revealed that respondents were in agreement ($MS=3.91$; $SD= 1.01913$) that accessibility to ICT equipment influences principals' leadership in ICT integration.

Technology at most relies on power supply as a pre-requisite to run and majority of the schools had installed electricity through the KREP simplified approach which correlates with Makhanu and Kamper (2012) study that most rural schools just like urban, installed electricity through KREP. Availability of electricity alone was not enough but reliability made a lot more sense to integration. Data from interviews, observation checklist and document analysis pointed out that most schools (70.5%) had electricity installed; the undoing was frequent power outages which

frustrated integration processes. Respondents were neutral($MS=2.68$; $SD=1.15605$) that power influences principals' leadership in ICT integration. This finding conform to Kimuyu, Kalai and Okoth (2016) finding that there was a statistically significant relationship between uninterrupted power supply and integration ($P=.004$) and vice versa.

In TPAD, one of the items that principals are assessed is time management, how effective they keep time. Data from interviews and document analysis revealed that understaffing coupled with shortage of ICT facilities posed a challenge in the integration of ICT. With reference to principals' leadership, Laaria (2013) and Abdelwahed (2016) assertions corroborate that integrating ICT over burdened principals as indicated by 65.56% in multi-tasking management skills and lack of time as indicated by 75% of respondents respectively. Principals in their leadership are obligated to set clear goals and discuss with school teams which provide opportunities to develop collective understanding on implementation. The dynamism in the advancement of ICT lays grounds for principals' leadership to initiate immediate changes in management process through teambuilding to secure time management. As Kahuthia and Thinguri (2017) would argue, effective principals' leadership carry out early planning and through the principle of delegation allocate duties to various staff based on talent and area of specialization. The essence is to provide an enabling environment for time management in ICT integration. With regard to this finding, DOS were highly in agreement ($MS=4.11$; $SD=1.03575$) that time resource influences principals' leadership in ICT integration in their office.

Principals 'attitude towards ICT ultimately determines the success of integration and in most cases its seen in their commitment to ensure all ICT essentials are in place for integration. Nangue, Creunen and Church (2010) argued that phobia; resistance to change and sometimes age could lead to negative attitudes towards ICT integration. In contrast, The level of principals

attitude towards ICT determines the speed and depth of integration as positive attitude motivates one to integrate ICT in DOS office. Data from interview schedule and document analysis indicated that attitude was a result of other factors especially for sub county schools which were still struggling to make ends meet. Most schools national activities were online based and principals are dictated by policies, requirements or circumstances to comply. The findings indicated that respondents were highly in agreement ($MS= 4.07$; $SD= 1.10303$) that attitude influences principals leadership in ICT integration.

Observation checklist and document analysis data established that DOS (44.3%) were within an active age bracket of 35-39 years that presumably embrace ICT but the age of the principal too influences an individual's acceptance of change. According to Edward, Matula and Kalai (2015) study, principals in the age bracket of 31-40 years accessed and used computers at 52% frequency which was associated with the education system they went through assumed to have already embraced ICT unlike the 50 plus year olds. In this study, however, only 26.8% of principals were in the age bracket of 40- 44 while majority (42.7%) were in the age bracket of 45- 49. In this study the DOS were neutral($MS=2.57$; $SD= .99541$) on age as influencing principals' leadership in ICT integration.

Room to integrate ICT referred to anywhere staff could easily access ICT equipment and use. Observation checklist and document analysis data revealed that there was a notable lapse on the management support for operating rooms for ICT integration. However, according to the DOS, there was a statistically significant relationship between operating room for ICT and ICT integration in their office as evidenced in probability value ($P=.011$). This implies that where there was operating room with available and functional ICTS, integration would be carried out. Data from interviews portrayed principals description of ICT as expensive and required colossal

amount of money to make it happen. This was based on MOE ban of PTA levies which schools relied on under computer vote head. This finding was consistent with Adomi and Kpangban (2010) that high cost of ICT facilities and low budgetary allocation hindered application of ICT. Principals' leadership need to focus on TCO when planning for ICT integration. This illustrated that respondents were neutral ($MS=3.06$; $SD=1.43978$) on operating room as influencing principals leadership in ICT integration.

4.6.3.2 Regression Analysis of DOS' Response on Principals' Leadership in ICT Integration

To verify whether there were statistical relationships between the selected factors and principals' leadership in ICT integration, data from DOSs were subjected to regression analysis, which are presented in Table 4.13. The regression results in Table 4.13 indicated that there was a significant relationship between selected independent variables namely financial resources ($p=.037$), administrative support ($p=.002$), Internet connectivity ($p=.000$), technical support ($p=.015$), time resource ($p=.001$), teachers' age ($p=.009$) and operating rooms for integration of ICT ($p=.011$) and the integration of ICT in management activities in the DOS office. This was evidenced by their statistically significant correlation at 95% confidence level. Further, with an adjusted R-squared as .9637, 96% of the variance in ICT integration in management tasks in DOS office is collectively linked to the influence of the selected factors. Further afield, an increase in financial support by .005643 administrative support by .00218, Internet connectivity .437596, technical support by .1152582, time resource .1406775, teachers' age .1331241 and operating rooms for ICT integration .0043949 would influence positive change in ICT integration in management in DOS office by 1%. The findings also indicated that there was a large effect size as seen from

Cohen's $f^2 = \frac{R^2}{1-R^2} =$ According to Cohen, (1988); Kelley and

Preacher, (2012), there was a greater influence of the listed factors in regression equation towards Principals' Leadership in ICT Integration in DOS office.

Table 4. 12: Regression Analysis of DOS' Response on Principals' Leadership in ICT Integration

Model summary						
Model	R	R ²	Adjusted R ²		Standard error estimate	
1	.9838	.9679	.9637		.09215	
Details of regression						
Factor	Beta-coefficient	Std error	t	p-value	Critical values for 95% C.L.	
					Lower bound	Upper bound
Financial resources	.005643	.0335742	0.17	.037	-.0724089	.061123
Training in ICT	-.0135417	.026201	-0.52	.607	-.0656451	.0385616
Admin. support	.3702181	.0552055	0.04	.002	-.1076012	.1119631
Internet Connectivity	.437596	.0535976	8.16	.000	1.031011	1.244181
Technical support	.1152582	.0465075	-2.48	.015	-.2077434	-.022773
Access to ICT equipment	-.0175099	.0094879	-1.85	0.07	-.0363777	.0013579
Power supply	.0003812	.0216912	0.12	.986	-.0427541	.0435164
Time resource	.1406775	.0417823	3.37	.001	-.2237662	-.0575889
Attitude towards ICT	.0051594	.0606539	0.09	.932	-.1154574	.1257763
Teachers' age	.1331241	.0496252	2.68	.009	.0344389	.2318092
Room to integrate	.0043949	.0165436	0.27	.011	-.0285039	.0372936
(constant)	.0286028	.0819756	0.35	.728	-.1344147	.1916203

Regression equation

$$Y = .0286 + .006FR + .002AS + .438Int + .115TS + .1468TR + .1331TA + .0043Room$$

Where Y=ICT Integration in PSSM

FR=Financial resources

AS=Admin Support

Int= Internet Connectivity

TS=Technical Support

TR=Time Resources

TA= Teachers' Age

Room=Room to integrate

This study demonstrated that there was large effect and significant relationship between financial resources and principals' leadership in ICT integration ($\beta = 0.5643$; $p = 0.037$) which meant that a unit increase in financial resources would lead to an increase of about 0.5643 in ICT integration in management tasks in DOS office. The office of the DOS is one of the very busy offices in school regarding ICT use and therefore requires good financial support for running of the ICT equipment. Already principals' leadership invested financial resources in DOS office than other departments and more financial resources would go a notch high to ensure functional Internet connectivity and related functions were maintained in the DOS office. The results depict a significant effect of administrative support on principals' leadership in ICT integration ($\beta = 0.3702181$; $p = 0.002$) implies that an increase in administrative support would lead to an increase of 0.3702181 in ICT integration in management functions.

For successful integration of ICT in schools, administrative support from principals and to principals would scale integration to high levels. Although much expectations are upon principals leadership to provide administrative support, they too require administrative support in cases beyond their limit. Besides, there was a significant relationship and large effect of Internet connectivity on principals' leadership in ICT integration ($\beta = 0.437596$; $p = 0.000$) implies that a unit increase in Internet connectivity would trigger an increase of 0.4375 in ICT integration in management activities in DOS office. Internet connectivity is therefore the most important factor in integration in the office of the DOS. The office of the DOS conducts lot of online activities and would require functional Internet connectivity most of the time to perform their management tasks and therefore its availability would enhance integration activities.

Similarly there was a moderate effect and significant relationship technical support and principals' leadership in ICT integration ($\beta = 0.1152582$; $p = 0.015$) implies that a unit increase in

technical support would lead to an increase of 0.11528 in ICT integration. Through document analysis, it was found that most schools hired certificate level ICT technicians, use computer teachers as ICT technicians or outsource technical expertise. The ICTs in schools need a well qualified ICT technician to offer support to staff and maintenance. This study was inconsistent with Kimuyu, Kalai and Okoth (2016) findings that availability of technical support had insignificant effect on ICT integration at $p=.05$ which they attributed to principals' attitude of outsourcing services handled any issue on ICT. Similarly, there was a significant relationship and moderate effect size of time resource on principals' leadership in ICT integration ($\beta=.1406775$; $p=.001$) implies that an increase in time management would give an increase of 0.140677 in ICT integration. Data from document analysis and interview schedules revealed that there was a big issue when it comes to staffing and teachers were overwhelmed with work. Therefore if there was adequate time especially if staffing was improved on, ICT integration in the office of the DOS would be adequate and on time. The findings indicated that teachers' age had a significant relationship and moderate effect on principals' leadership in ICT integration ($\beta=.1331241$; $p=.009$) implies that an increase in staffing teachers who are ICT savvy with regard to age in DOS office would improve on ICT integration by about 0.133124. The role of teamwork, ICT committee and school ICT policy would support the principal's leadership regardless of their age. This observation differed from Mutysia, Mulwa and Mwanja (2017) study findings which reported that there was a strong negative relationship $r(50)=-0.750$, $p=.05$ between principals age and ICT integration. The justification was that young principals were more likely to integrate ICT than the old. Also, there was a significant relationship though with small effect of room to operate ICT from on principals' leadership in ICT integration ($\beta=.0043949$; $p=.011$) implies that a unit increase in room to operate ICT from would give an

increase of 0.004394 in ICT integration. From document analysis and observation checklist it was established that teaching staff were allowed to access ICTs in the office of the DOS on management work related yet the rooms were less spacious. Therefore, if DOS offices were expanded in terms of space other factors notwithstanding, ICT integration would increase as teachers would have space to work simultaneously.

Regression results revealed that there was no significant relationship between training and principals' leadership in ICT integration ($\beta = -.0135417$; $p = .607$) in management tasks in DOS office. This factor also had a small effect size $\beta = -.0135417 = 0.0135417$.

This study established that there was small effect size $\beta = 0.175$, and insignificant relationship between access to ICT equipment and principals' leadership in ICT integration ($p = .068$) in management functions in the office of DOS. The results on DOS indicated that there was insignificant relationship and small effect of management processes in the DOS office ($\beta = .0003812$; $p = .986$). The DOS' responses also indicated that there was insignificant relationship and small effect of attitude on principals' leadership in ICT integration ($\beta = .0051594$; $p = .932$) in management tasks in the DOS office.

4.6.4 Class Teachers' Responses on Factors Influencing Principals' Leadership in ICT Integration

4.6.4.1 Descriptive Statistics Results on CTs' Responses on Factors Influencing Principals' Leadership in ICT Integration

The CTs' responses on factors influencing principals' leadership in ICT integration in class management were as presented in Table 4.14.

According to CTs responses, observations where the MS were rounded up to two decimal point were administrative support ($MS=3.90$), technical technical ($MS=4.10$), access to ICT equipment ($MS=3.63$), time resource ($MS=3.69$), attitude towards ICT integration ($MS=3.64$) and operating room ($MS=3.68$). Average Mean Rating was =3.09.

Table 4. 13: Descriptive Statistics on CTs’ Responses on Factors Influencing Principals’ Leadership in ICT Integration

Scores on Individual Items					
Factors	N	Minimum	Maximum	Mean	Std. Deviation
Financial resources	270	1.00	5.00	3.14	.86949
Training in ICT	252	1.00	5.00	1.88	.65117
Administrative support	268	1.00	5.00	3.90	1.22746
Internet Connectivity	267	1.00	5.00	2.50	1.19326
Technical support	270	1.00	5.00	4.10	1.11944
Access to ICT equipment	270	1.00	5.00	3.63	1.28361
Power supply	270	1.00	5.00	1.69	.87135
Time resource	270	1.00	5.00	3.69	1.11406
Attitude towards ICT	270	1.00	5.00	3.64	1.14417
Teachers age	270	1.00	5.00	2.14	.78064
Room to integrate	270	1.00	5.00	3.68	1.14224
Average Mean				3.09	

To estimate the working capital with regard to influence on principals’ leadership in ICT integration, their expenditure would be seen in the availability of adequate functional ICTs. Integration of ICT requires reasonable amount of funds to adhere to the principle of TCO with regard to ICT integration however, interview schedules, document analysis and observation checklist data indirectly revealed the practice of TCO was overlooked. It was further established that Sub County schools were faced with financial constraints to facilitate ICT integration in class management, the situation was not any better in established schools of county and national category. Teachers were however not privy to school financial matters except when it comes to

CDF funds and PTA which are usually discussed in the open and during meetings. Earlier studies pointed out the issue of huge financial resources in the establishment and integration of ICT. Papaoiannu and Kyriacos (2011) study in Cyprus revealed that to establish ICT, there was need for huge investments in infrastructure and maintenance. Similarly, Kashem and Haque (2014) study in Bangladesh also revealed that 52.9% of secondary school teachers agreed and 19.6% strongly agreed that there was need to spend quite an amount of funds on ICT purposes. They concluded that teachers believed in heavy investment in ICT for its success. This finding demonstrates that respondents were neutral ($MS=3.14$; $SD=.86949$) with the item financial resources influence principals' leadership in ICT integration. The CTs are hardly in the know with matters finance in schools unless its something that requires public knowledge such as donations and are right to stand safe ground on finance.

Regarding level of training in ICT, most CTs underwent training in ICT at workshop (52.2%) and certificate level (28.9%) meaning most of them had basics in ICT integration. Training plays a valuable role in enriching principals' leadership know-how on the new idea and in the process gain competence and self efficacy in integrating ICTs. Under the principle of delegation of duties, other staff members in school would oversee the process and report to the principals. Empirical studies indicate that most teachers and principals could not integrate ICT in management tasks due to lack of training in ICT which affected their knowledge and skill competence (Oluoch, Ajowi & Bosire 2015; Unachukwu & Nwankwo 2012). This then provides grounds for formal training in ICT and as Wanjala, Adhiambo and Ngumbi (2013) observed, ICT trained teachers facilitated easier application and use of ICT in school administrative functions. Respondents indicated that CTs were in disagreement ($MS=1.88$; $SD=.65117$) that training

influences principals' leadership in ICT integration as some could be ICT savvy without any formal training.

Principals' leadership is depended on for implementation of school projects however this is usually twofold depending on the kind of support that is provided. Through observation checklist, some schools had quite a number of unreliable and undependable ICT equipment while functional ones had outdated hardware and software. With committed administrative support ensures availability and functionality of equipment updated with latest software. As Wanjala, Adhiambo and Ngumbi (2013) would argue, principals' leadership could provide administrative support by adopting acquisition of low maintenance ICT infrastructure especially in economically poor schools. Data from document analysis indicated that principals supported CTs in ICT integration by allowing access to any available ICTs in school. Principals perhaps needed to rethink availability of ICTs. This study disagreed with Waweru and Gitumu (2014) study that school management did not support ICT programs in schools as indicated by 53.8% of respondents. The CTs were in agreement ($MS=3.90$; $SD=1.22746$) that administrative support influences principals' leadership in ICT integration.

Internet connectivity in schools enables management perform online management operations such as email, website, browsing and since the recent past TPAD, communication with TSC, KRA and KNEC among others. Despite the importance of Internet connectivity, most parts of Bungoma County had poor network connectivity from service providers which slowed down ICT integration in addition to the high costs of connectivity. For this reason, CTs hardly accessed Internet in schools which was inconsistent with Nangue, Creunen and Church (2010) study that Internet accessibility among teachers was quite high (83.3%) hence adequate use in Cameroon. Through observation checklist data, no school had Internet connectivity specifically for CT

management activities but document analysis data pointed out that some schools with Internet connectivity allowed CTs to access specifically for school professional purposes. Otherwise Internet services were geared towards administrative purposes basically by the principal and DOS office on purely management activities. This scenario restricted CTs from integrating ICT at class management level; an observation supported by Wanjala, Adhiambo and Ngumbi (2013) that teachers were not able to integrate ICT due to shortage of ICT infrastructure. Consequently most CTs employed traditional paper work for data capture as required (MOE, 2012). The CTs were neutral on Internet connectivity as influencing principals' leadership in ICT integration ($MS=2.50$; $SD= 1.19326$) because they don't access Internet easily.

Technical support is required to enhance integration in terms of ICT equipment maintenance and support for less techno savvy teachers. Through document analysis and interview schedule it was observed that principals hired less qualified technicians whose technical support was relatively unreliable and also relied on outsourcing services which was expensive. Observation checklist further established that there were schools with ICT equipment that were non functional not that they were unrepairable but such principals leadership on administrative support was lacking. The study was supported by Muriithi and Zengele (2015) study findings that ICT equipment in PSS in Kirinyaga County, Kenya were maintained majorly by hiring ICT expert firms ($MS 4.44$), ICT expert firms in collaboration with computer teachers ($MS4.1$) and computer teachers alone ($MS 4.03$). Sharadha (2016) on the other hand emphasizes the need for technical support in school as lack of such important personnel led to time wastage and finances on repair and maintenance emanating from troubleshooting problems. There was high agreement on technical support as influencing principals' leadership in ICT integration ($MS=4.10$; $SD= 1.11944$).

Access to ICT infrastructure was identified as one of the factors influencing principals' leadership in ICT integration in class management. Data obtained through interviews and document analysis showed that accessibility to ICT equipment in schools where there was shortage was a big problem. However, CTs accessed ICTs in computer lab and furnished DOS office only in schools where ICTs were available. The finding resonates with Nangue, Creunen and Church (2010) findings that most teachers were limited in integrating ICT because of unavailability (66.7%) and inaccessibility (51.9%). In the same breath, Shihundu and Luketero (2014) asserted that teachers (81%) had no access to school cellphone and desktop computer with Internet connectivity (90.5%) in Bungoma East Sub County, Bungoma County, Kenya. Divergently, Kiptalamand Rodrigues's (2010) observed that an overwhelming 98% of teachers in both rural and urban schools in Elgeyo- Marakwet, Kenya accessed computers and 82.7% Internet in various rooms ranging from laboratories, principals' offices, libraries, lounge and other offices. The foregoing studies paint a picture of well established and ICT equipped schools unlike Bungoma County. The CTs were in agreement that access to ICT equipment influences principals leadership in ICT integration ($MS=3.63$; $SD= 1.28361$).

Reliable power supply is the mainstay of functional technology use. Through observation checklist it was found that most schools had electricity installed through the KREP but reported regular power outages that interferred with smooth use of technology in schools. Although classes had electricity but other issues related to power supply could not be ignored which according to Quest, Khandjeo and Mushaandja (2014) include power outages and fluctuations. Kimuyu, Kalai and Okoth (2016) observed that availability of computers and uninterrupted power supplies were significant ($P=.05$) and influenced ICT use. They further indicated that unreliable power supply was deterrence to ICT integration since majority if not all relied on

power. Respondents were however in disagreement that power supply influenced principals' leadership in ICT integration ($MS=1.69$; $SD=.87135$).

Time is a resource in every organization and integration of ICT in PSSM is not an exception. Time factor goes hand in hand with teachers' ICT knowledge and skills and staff establishment. In Jordan, Abuhmaid (2011) observed that teachers were already overloaded and could hardly cope with other activities like integrating ICT. The situation in Jordan mirrored a typical staffing status in Bungoma County where most PSS were understaffed especially in the rural set up (CDTSC Bungoma County, 2016). Time constraint was real but same time used in paper work could still be used with ICT integration. According to CTs responses, ICT integration in class management would happen if they had adequate time but inadequate ICTs and administrative support coupled with limited access were a hindrance. It was established that respondents were in agreement ($MS=3.69$; $SD=1.11406$) that time influences principals' leadership in ICT integration depending on their school experiences.

Principals' attitudes and beliefs towards ICT integration in class management activities play a predominant role in the concept. Success of integration depends on attitude usually guided by knowledge on benefits of ICT. While principals' attitude towards ICT was important, document analysis data revealed other pressing factors like availability and adequacy of ICTs, accessibility and administrative support that needed to be addressed. Principals with positive attitude towards ICT integration were motivated to integrate and vice versa which concurs with Oluoch, Ajowi and Bosire (2015) finding that negative attitudes among staff members towards ICT integration was a limitation to its success. This supports benefits of working on teachers' attitude to embrace change for success. The study revealed that respondents were in agreement ($MS=3.64$; $SD=1.14417$) that attitude towards ICT integration in class management influenced integration.

Most principals (69.5%) in this study were between 40 and 50 years, the age bracket which was found to be positive with regard to ICT integration in class management activities. Medeiros, Crilly and Clarkson (2012) while discussing age of adults observed that older adults compared to young adults apparently developed less interest in ICT tools and resources implying that principals who were older adults would ineffectively ensure ICT integration in class management. This study agreed with Edward, Matula and Kalai (2015) assertion that principals between the age of 31-40 mostly integrated ICT in management (76%). They further observed that principals aged 50 and above did not integrate ICT in school management. This was attributed to the time period of the education system they underwent which presumably had not introduced ICT training. Some older teachers might have difficulties integrating ICT due to lack of exposure to various ICTs or troubleshooting technicalities that are sometimes frustrating but this was not a glaring concern. The CTs were in disagreement($MS=2.14$; $SD=.78064$) with age as influencing principals' leadership in ICT integration.

Operating rooms in schools have been a big challenge with regard to ICT integration. Observation checklist data indicated that most ICTs were accessed in the principals' office, secretarial pool, DOS, computer room if any and occasionally in DPs office. Laaria (2013) findings in divergence opined that room was not a factor as such but the inadequacy of the ICT equipment therein was more important to majority. From observation checklist, it was noted that some schools had computers but for lack of room, the computers were kept in unused rooms. Principals' leadership in such situations failed to hold grip of innovativeness where there were ICTs without operating rooms. Observation checklist and document analysis revealed that there was an immense problem regarding room especially in Sub County schools which were economically unstable than national, extra County and county category. Mwikya, Imonje and

Mugambi (2014) study established that 56.3% of schools in Migwani Sub County, Kitui County had less than five computers in school while 18.8% had more than 20 computers, 47.9% of computers were located in offices, 43.8% computer lab and 2.1% in the staffroom. Based on this finding, respondents were in agreement ($MS=3.68$; $SD=1.14224$) that operating room influences principals' leadership in ICT integration.

4.6.4.2 Regression Results on CTs' Response on Principals' Leadership and ICT Use

To verify whether there were statistical relationships between selected factors already presented under descriptive statistics and principals' leadership in ICT integration, data from CTs was subjected to regression analysis and Table 4.15 depicts results of the test run.

The regression results in Table 4.15 shows that there was a significant relationship between selected independent variables administrative support ($p=.000$), technical support ($p=.003$), access to ICT equipment ($p=.012$), time resource ($p=.000$), and operating rooms for integration of ICT ($p=.000$) and ICT integration in management activities in class management. This was demonstrated by their statistically significant correlation at 95% confidence level. With an adjusted R-squared as 0.8237, it means that 82% of the variance in ICT integration in class management is collectively attributed to the influence of selected factors. Further afield, these results imply that, an increase in administrative support by .52372, technical support by .2101824, time resource .3502858 and operating rooms for ICT integration .9891727 would influence a positive change in ICT integration in management activities in the office of the DOS by 1%. The study also has evidence of a large effect size as evidenced by;

Cohen's $f^2 = \frac{R^2}{1-R^2}$ therefore based on Selya, et al (2012), it means

that the listed factors in the regression equation had a major influence on Principals' Leadership in ICT Integration in the classroom management.

Table 4. 14: Regression Results on CTs' Response on Principals' Leadership in ICT Integration

Model summary						
Model	R	R ²	Adjusted R ²		Standard error estimate	
1	.91198	.8317	.8237		.19916	
Details of regression						
Factors	Beta-coefficient	Std error	t	p-value	Critical values for 95% C.L.	
					Lower bound	Upper bound
Financial resources	-.0158946	.0507962	-0.31	.755	-.1159799	.0841908
Training in ICT	.0009773	.0354968	0.03	.978	-.0689632	.0709178
Admin. support	.5237198	.086219	6.07	.000	-.6935998	-.3538397
Internet Connectivity	.01995	.0240192	0.83	.407	-.0273758	.0672757
Technical support	.2101824	.075815	2.98	.003	.0711135	.3492513
Access to ICT	.0346387	.0136494	2.54	.012	-.0615326	-.0077448
Power supply	-.0208413	.0298058	-0.70	.485	-.0795687	.0378861
Time resource	.3502858	.0577038	6.07	.000	.236590	.4639813
Attitude towards ICT	-.0164363	.0229018	-0.72	.474	-.0615604	.0286877
Teachers' age	-.0475325	.0825952	-0.58	.566	-.2102724	.1152074
Room to integrate	.9891727	.0762645	12.97	.000	.8389063	1.139439
(constant)	.1637994	.1360162	1.20	.230	-.1041975	.4317964

Regression equation

$$Y = .1638 + .5237AS + .2102TS + .40346ICT\ Acc + .3503TR + .9892Room$$

(.0862) (.0758) (.0136)(.0577) (.0763)

Where Y=ICT Integration in PSSM

AS=Admin Support

TS=Technical support

Int= Internet Connectivity

TR=Time resources

Room=Room to integrate

This study established a large effect size and significant relationship between administrative support and principals' leadership in ICT integration ($\beta=.5237198$; $p=.000$) which implies that a unit increase in administrative support would give an increase of about 0.5237 in ICT integration in class management activities. Principals' are looked upon as responsible for supporting school program implementation. In addition, the study revealed a moderate effect and a significant relationship between technical support and principals leadership in ICT integration ($\beta=.2101824$; $p=.003$) implying that a unit increase in technical support would cause an increase of 0.210182 in ICT integration in class management processes. The role of technical support could be described as immeasurable in terms of ICT equipment repair and maintenance, providing support to staff and advising the school leadership on ICT related matters. The attention given to ICT technicians could only be identified with principals outsourcing expertise in the area when need arises. Also, there was a moderate effect and a significant relationship between access to ICT equipment and principals' leadership in ICT integration ($\beta=.0346387$; $p=.012$) which implies that a unit increase in access to ICT equipment would change with about 0.034687 in the integration of ICT in class management activities. Data from interview schedule, document analysis and observation checklist revealed that teachers' accessibility to ICT equipment did not apply in all schools. However, they could access in DOS office and computer room if any which limits usability. The findings concur with Makhanu and Kamper, (2012) that accessibility to ICTs did not necessarily translate into integration as there was a statistically significant very weak positive relationship ($p=.05$) between principal's access and ICT integration. Most principals expressed concerns over understaffing which weighs heavily on teachers' workload. The regression analysis indicated that time was a strong predictor of principals' leadership in ICT integration since there was a significant relationship and large effect size ($\beta=.3502858$;

$p=.000$) implying that it was the most important factor in ICT integration in class management. Similarly, this study revealed that room to integrate ICT was among the strong predictors of principals' leadership in ICT integration due to its large effect size and a significant relationship with ICT integration ($\beta=.9891727$; $p=.000$). Interview schedule and observation checklist data showed that some schools had functional ICTs but the equipment were safely stored somewhere for lack of room.

According to CTs' responses, financial resources had no significant relationship though with moderate effect size on principals' leadership to integrate ICT ($\beta=-.0158946$; $p=.755$) in class management tasks. Training had insignificant relationship and small effect on principals' leadership in ICT integration ($\beta=.0009773$; $p=.978$). This study aligns with Kimuyu, Kalai and Okoth (2016) that there was no significant effect ($p=.05$) between principals' ICT literacy levels and ICT integration. This study established that Internet connectivity had no significant relationship though with moderate effect size on principals' leadership in ICT integration ($\beta=.01995$; $p=.407$). The results showed that there was moderate effect and insignificant relationship between power supply and principals' leadership in ICT integration ($\beta=-.0208413$; $p=.485$). The CTs' responses indicated that there was insignificant relationship and moderate effect of attitude on principals' leadership in ICT integration ($\beta=-.0264363$; $p=.474$). Further, the study revealed that there was insignificant relationship and moderate effect of teachers age on principals' leadership in ICT integration ($\beta=-.0475325$; $p=.566$).

4.7 Principals' Involvement of Stakeholders in ICT Integration

The principals were asked to indicate how they involved stakeholders in ICT integration and their responses were presented as in Figures 4.13 -4.16.

4.7.1 Principals' Responses on their Involvement of Stakeholders in ICT Integration

Figure 4.13 demonstrates principals responses on their involvement of stakeholders in the integration of ICT.

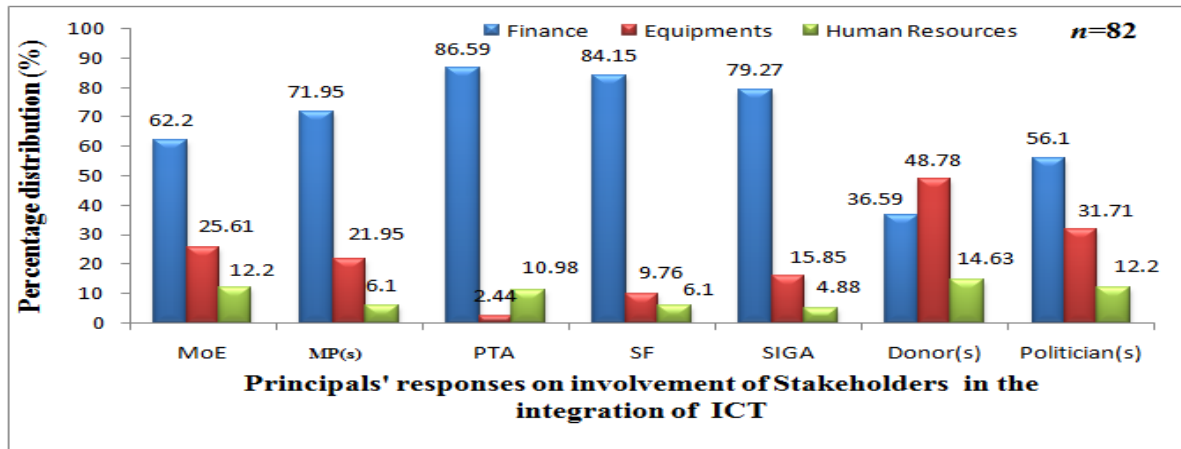


Figure 4. 13: Principals' Response on their Involvement of Stakeholders in ICT Integration

Figure 4.13 depicts principals' responses on their involvement of stakeholders in ICT integration in PSSM in various ways with the outcome summed up in three categories namely finance, ICT equipment and human resource. Respondents indicated each category of stakeholders provided support such as 51(62.20%) indicated MOE provided finance, 59(71.95%) cited MPs through the CDF kitty provided finance, 71(86.59%) cited PTA support being finance, 69(84.15%) stated that SF kitty provided financial support, 65(79.27%) indicated that SIGA provided financial support and 46(56.10%) observed that various politicians supported ICT integration through finance.

According to this study, principals involved stakeholders in the integration of ICT in PSSM directly or indirectly. Principals reached out to the MOE through proposal writing as a major stakeholder in PSS for financial support to facilitate integration. Data from interviews indicated that proposal writing to MOE had its own challenges even so, that was how MOE was involved.

A principal stated:

“ Although i hear MOE has been funding schools through proposal writing, I have never received such funds in this school. I don’t know what MOE base on to award such funding, I have given up on proposal writing to MOE for funding even if the school is so in need anyway”.

Conversely, 62.2% of schools received funds from MOE which in some cases was for purchase of various ICTs done through virement. Principals initiated the virement process where document analysis data from BOM, PTA and staff meeting minutes revealed that principals sought for approval to purchase ICTs. Some PSS according to 25.61% of the respondents benefitted from the government ESP initiative which accounted for the huge digital divide on computers in each school. Principal beneficiaries of ESP comfortably talked of their well established ICT base stating that:

“The government has greatly supported us towards ICT through the ESP. We received 11 computers, a laptop, 11 UPS, a printer, an LCD projector, networking (Local Area Network- LAN) and Internet. Although the equipment was meant for students taking computer studies, as a school we can’t complain since our teachers are allowed to use and yes, we do integrate some in administrative tasks”.

However, this scenario was not uniform across PSS in the county as some schools had totally no single computer while others had 1-20 from ESP which was confirmed from document analysis such as BOM, PTA and staff meeting minutes. This finding resonates well with Kukali (2013) study which highlighted the MOE role in ICT integration such as provision of ICT equipment.

Principals involved the MOE through TSC on school staff establishment with ICT or computer teachers as indicated by 12.2% who supported the program for successful integration. Although the TSC units at sub county, county and even headquarters were cognizant of the staffing positions in PSS, principals made requests sometimes through written, verbal or quality assurance and standards assessment where staff establishment was captured. A principal asserted “ the school is so much in need of an ICT or computer teacher but the TSC has failed to post one

to the school. With meager resources it is a great challenge to hire one”. On the MOE role, through school returns, principals indicated the need for teachers in particular areas and TSC would act on staffing by posting ICT teachers to some schools however document analysis data revealed a great shortage in most schools. This study was divergent from Nyanchoka, Matula and Kalai(2015) findings where 60% of schools involved teachers than ICT technicians implying the schools had more computer teachers. On the contrary, the latter did not specify whether computer teachers were TSC employees or inclusive of BOM teachers.

The Kenya government through MOE embraced teacher training and support from the year 2010 under the ESP where five schools per district were identified, equipped with ICT infrastructure and mounted capacity building for teachers. Teacher mentors who would be referred to as ICT champions were recruited to assist teachers in the field to integrate ICT. Further afield, MOE train teachers through workshops like SMASSE programs at sub county levels; to cascade knowledge to other teachers. This was however based on principals’ leadership on capacity building in ICT. For instance a principal observed: “ Some of our teachers gained ICT knowledge and skills through SMASSE workshops which has really been instrumental in peer tutoring among teachers. From document analysis it was established that schools ensured their teachers of science took part in SMASSE workshops, a program organized by the MOE through its CEMASTEIA institute.

In Kenya, CDF is a form of subsidy through which devolved funds in constituencies roll down to finance education among sectors. The principals involved local area MPs who are in charge of CDF through proposals requesting for support towards ICT integration. This study established that 71.95% of schools through principals’ leadership received funds from CDF. A principal opined “Through CDF, we have been able to install electricity and buy three computers which

are inadequate but currently assisting us in management activities”. Another observed “Although most CDFs are for specific infrastructural projects, our school administration block was constructed to provide room for all HODs and majority with PC run departmental management programs. The issue of room has been solved but the school was lacking basic ICTs”. In as much as CDFs were handy, a principal observed that MPs were easily involved during campaign periods and they took advantage of the situation to organize for fundraising with the purpose being acquisition of ICTs. Innovativeness is one of the qualities observed on the TPAD and such principal was just practicing what is required of them. Through observation checklist and document analysis it was revealed that MPs through CDF did not directly support schools in ICT acquisition which echoed Ng’alu and Bomett (2014) study findings that the role of MPs in ICT integration was not directly reflected.

Other areas where principals involved MPs included equipment and ICT infrastructural acquisition and human resource support. It is not common place for MPs to directly provide CDF for acquisition of ICT equipment except in rare circumstances where some schools were privileged to be provided with some ICTs like computers and printers. Document analysis data disclosed that schools which acquired computers through ESP were the same beneficiaries of CDF support for ICT which accounted for wide discrepancies in ICTs available. One principal observed:

“I even don’t know how it happened but when I heard the area MP was going to give out computers to some unknown schools, I decided to approach the CDF manager to talk to the MP about my interest in the computers. I was lucky I received more than I expected. It was just mere luck because not all schools received the donation”.

Through cost sharing policy, parents under PTA school projects were the main financiers of school projects. A whopping 86.59% of respondents asserted that through PTA projects, the

school comfortably purchased essential ICTs such as computers, management software, printers, photocopiers, installed electricity, modems, maintained school Internet services and hired ICT technicians. On the contrary, developing schools commonly referred to as CDF schools with low enrolment had difficulty obtaining funds from PTA. One principal observed, “Paying fees is one of the biggest challenges encountered among parents and it would really be unrealistic again for me to expect them fund ICT projects. I will continue outsourcing ICT services from cyber café or ask for support from my teachers”. Another principal stated that most of the ICTs in school were acquired through PTA computer project. Through the same vote head, we are able to maintain and service out ICTs at the same time. While the current study established that principals highly involved PTAs in the integration of ICT, Oloo (2009) pointed out at a paltry 16.07% as having contributed towards ICT in secondary schools. From document analysis, principals leadership involved PTA by discussing with them to support ICT projects while others requested SCDE or CDE to allow them levy parents on ICT project.

In some schools parents under the flagship of PTA projects, individually contributed ICT equipment in form of laptops, printers and computers as revealed by 3.65% through document analysis. Most support staff in secondary schools are hired by BOM and paid through PTA levies. Among the support staff hired were the technicians whose services included maintenance, repair and support of ICT users where necessary. Document analysis revealed that through PTA levies, over half of the schools managed to hire technical support and computer teachers. This relates to major PTA role towards ICT as principals’ initiative. Some principals observed:

“Hiring a highly qualified ICT technician is rather costly thus why we go for certificate level holders who sometimes are quasi competent anyway. This is because the more qualified the higher the remunerations which we might not afford; we therefore prefer outsourcing for more qualified personnel and services despite the challenges that come with it”.

While some principals' argument might hold, the whole idea amounts to spending for better services. This finding on one hand concurred with Katulo (2009) and Oloo (2009) that most schools depended on computer teachers and /or outsourced services courtesy of PTA levy. The principals' leadership is evident in efforts to cut on costs to integrate ICT.

Some principals in their leadership through school fund kitty supported the integration of ICT. Majority (84.15%) funded the integration of ICT with regard to TCO besides supporting PTA project in remuneration of workers. Principals obtained SFs through tuition, repair and maintenance vote heads as divulged through document analysis that school BOM minute authorized principals to spend. This however varied from school to school with regard to economic status as upcoming schools could not benefit much from the SF. Although the current study had convergent views with Oloo (2009), observation checklist data indicated that this did not apply in all schools as some operated on shoe string budgets. Use of SF in integration of ICT did not apply to all schools regardless of their economic status.

Innovativeness is one of the principals' leadership skills to develop structures meant to support and sustain school projects financially. Various SIGAs were established in schools as indicated by 79.27% of respondents depending on what BOM would find viable. A slightly below average number of schools funded ICT programs and hired human resource for the same purpose. In the sugar belt region of Bungoma County, a paltry 9.8% of schools acquired computers and printers from their sugarcane profits just as (6.1%) in the large scale maize farming regions. Other schools with more than 10 computers and school buses turned them into SIGA where outsiders enrolled for computer package lessons at a fee and hired buses respectively. This study finding was partially in agreement with Omukoba, Simatwa and Ayodo (2011) study in Eldoret Municipality, Uasin Gishu County, Kenya which established that some of the SIGAs included

dairy farming (33.3%), crop farming (33.3%), hiring of school bus (33.3%), accommodation (55.5%) and house rent (44.4%). While introduction of SIGAs is sometimes the principals' leadership creativity, a principal observed, I really work hard to convince the BOM to vire SIGA funds towards ICT integration since such SIGAs are supposed to be self sustaining.

The introduction of ICT in schools has had teething problems hence the attraction of donors and well wishers in supporting its growth. Some donors and well wishers came up under distinguished titles to financially support ICT integration in PSSM (36.59%), respondents asserted. One principal observed: "We receive funds from one donor friend of the school which is strictly for maintenance of the school website". While another indicated,

"One donor funded our DP for an ICT certificate course at Kenyatta University and through cascade model our HODs and CTs acquired basic knowledge and skills on ICT integration such as record keeping, preparation of professional records and communication".

In another school, a principal opined,

"Yes, donors come in handy on matters ICT. A donor gave us five computers for our geography department which were not adequate for curriculum delivery so we requested him to allow us convert into management use within the department. I am happy to report that the response was in the affirmative hence making the department integrate ICT in management activities. Since the school doesn't have adequate ICTs, we requested the department to allow other members of staff to access and use and it is well so far"

On the other hand, some principals either through proposal writing or partnerships received limited technical support from donors such as school net, Computer for Schools Kenya and national government which could not be generalized to all sample schools. Data from document analysis revealed that some schools had computers, laptops, printers and photocopiers courtesy of donors. While Nenywe and Ishikaku (2012) opined that oil companies had a role to contribute computers to schools, no school received a computer, any other form of ICT donations or even professional staff development from companies in Bungoma County. Donors and well wishers

are not easy to come by nevertheless principals working through other stakeholders are linked up to support schools in whichever way. Through document analysis it was established that principals in their leadership formed school alumni groups through which school needs were discussed and supported. In that particular school, the principal involved the school alumni who contributed four computers, a photocopier and several of modems to the school.

Apart from CDF under the area MP, all cadre of politicians have specific times where they really come in handy on school development projects. From interviews and document analysis, it was noted that some politicians supported PSS financially from which ICT equipment were acquired. In a school less than five years old since registration, among other projects, local government politicians helped install electricity and financed for acquisition of two computers and a photocopier which was through the principal's follow up both verbally and written requests. However a great number of schools were not supported by other politicians in ICT even on request as was established through document analysis and interviews. A principal opined:

“ I hear politicians in the county government support schools in ICT and other areas but I have tried them severally to support us even with a mere desk for learners and this has not been forthcoming.”

This was supported by document analysis where written requests had been made severally to politicians but no response at the time.

Another young school endowed with ICTs, principal, DP, DOS, all HODs and secretarial pool had computers with the latter having printer, photocopier, scanner and modems courtesy of a local politician. Some schools were able to hire ICT technical support and teachers besides maintenance of devices. Data from document analysis revealed that Internet connectivity in three schools was funded by politicians though dysfunctional due to poor maintenance. Politicians as stakeholders have high expectations of PSS principals' performance because they believe better service delivery fundamentally leads to success in academic performance. It was for this reason

that principals would keep in touch with politicians for support in various school programs. The principal in this school observed: “ As a school we have greatly benefitted from our politicians in terms of ICT gadgets. Its just unfornate that some of them we are not able to maintain them. Like you can see, our Internet is not working because of cost implications” Another observed: “ Through networking we managed to reach our politicians to support us in ICT. We have a good number of computers though there is lack of room for everybody to access them. Otherwise we are doing well and looking forward to more support towards construction of spacious staffroom to enable us use our desktop computers with ease”. The role played by stakeholders in establishing and embracing ICT concurs with Nandwah (2011) study that stakeholders greatly contributed to principals’ growth for effective and efficient running of schools.

4.7.2 Deputy Principals' Responses on Principals' Involvement of Stakeholders in Integration of ICT

Figure 4.14 depicts DPs' responses on principals involvement of stakeholders in the integration of ICT.

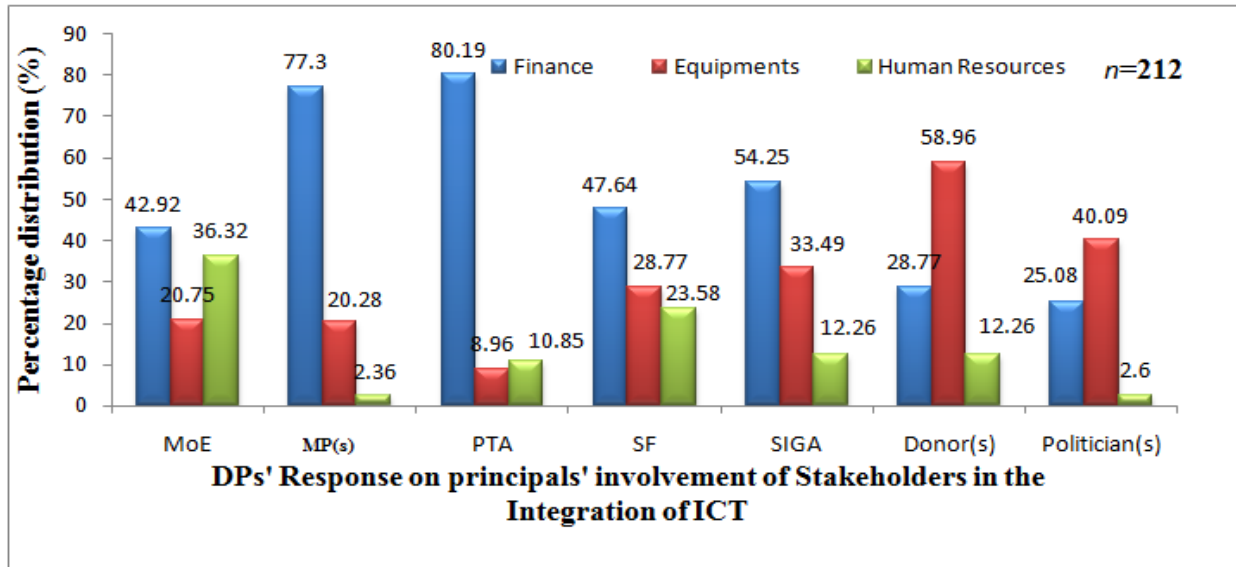


Figure 4. 14: Deputy Principals' Responses on Principals' Involvement of Stakeholders' in Integration of ICT

Figure 4.14 illustrates DPs' responses on principals' involvement of stakeholders in integration of ICT in which 164(77.36%) cited MPs, 170(80.19%) cited PTA, 115(54.25%) cited SIGA that provided financial support towards ICT integration while 125(58.96%) cited donors and well wishers and 85(40.09%) cited politicians as having supported integration of ICT through provision of ICT equipment.

The DPs' responses affirmed principals' involvement of MOE in the integration of ICT was through funding. They observed that MOE supported ICT programs through ESP where various ICTs were provided to some schools as indicated by 42.92%. The process involved principals writing proposals requesting for support and also in some instances, the MOE funded schools. Capacity building in ICT which was a challenge received support through SMASSE workshops

for mathematics and science teachers. Teachers who participated in SMASSE were therefore beneficiaries of MOE commitment to empower teachers with ICT knowledge and skills to enable them in the integration of ICT.

Further, principals who supported their teachers for KEMI seminars and trainings organized management courses for all school managers in which a unit on ICT was covered. This kind of arrangement enriched staff professional development in ICT nonetheless, the issue of self financing has all along been a hindrance to majority. Document analysis data revealed that well established and financially stable schools financed DPs for professional staff development under the school ICT policy program and staff development. Further it was noted that a donor supported the school DP for KEMI management course and in most schools a good number of DPs and DOS either sponsored themselves or they simply never underwent the training.

The FSE fund a government initiative through MOE indirectly contributed towards acquisition of ICT equipment in piecemeal. This finding was in line with Olibie and Akudolu (2009) and Katulo (2009) studies which indicated that the MOE among other stakeholders contributed to develop and sustain capacity building in ICT in secondary schools. On human resource, TSC staffed very few schools with computer teachers who doubled up as technicians usually initiated by principals. From document analysis it was revealed that most schools neither had ICT technicians nor had MOE vote head to hire a technician.

The role of CDF through area MPs in school development is significantly applauded in most schools. Outstanding number of respondents indicated that principals engaged MPs to support schools financially where such amounts were openly announced to staff, BOM, students and other stakeholders for particular projects. From document analysis and observation checklist, principals involved the CDF office in supporting schools by making requests verbally or in

writing and coming up with immediate school needs. Electricity being one of the CDF major projects in schools was in concurrence with Chesang, Okello and Kimitei (2016) study findings in Baringo Central Constituency, Baringo County, Kenya, where 61.3% of respondents' strongly agreed that CDF promoted installation of electricity in schools. Nonetheless, this applied only to new schools that benefitted on electricity since greater part established schools probably already had. While Chesang, Okello and Kimitei (2016) and Kukali (2013) studies revealed that MPs contribution through CDF excelled in construction of classrooms, dormitories, dining halls and laboratories, its commitment in promoting ICT was loudly minimal. In some schools, part of ICT equipment namely computers, photocopier and printers were acquired through CDF support under virement. Above and beyond, schools that received ICTs under the ESP umbrella, their teachers were trained by the supplier company CAMARA in only one Sub County.

The PTAC is a member of BOM charged with the responsibility of project initiation and development in school. According to this study, 80.19% of PTA under computer project usually initiated by principals greatly contributed towards ICT in PSS. A point to note is that whatever was raised under PTA computer project varied from school to school depending on various school needs. In line with the presidential directive of 1980, the current study resonated with Onderi and Makori (2012) findings that the role of PTA was to raise and manage funds for schools' development. Data from document analysis revealed that PTA involvement was openly discussed in school Annual General Meetings where DPs are usually master of ceremonies. Financial support enabled purchase of some computers, printers and photocopiers as was documented in school meeting minutes and ICT records on types and acquisition. In its role of funding school projects, PTA shoulders the burden of hiring teachers and ICT technicians to supplement what schools had and for general TCO of ICT which hurt on the schools 'economy

with low enrolment. Principals' involvement of PTA included holding meetings with parents on ICT integration, writing to SCDE or CDE for permission to levy parents.

The well to do schools with possibilities of having colossal amounts of money on their accounts, it was upon principals' leadership to convince management to purchase ICTs. Matters finance was a preserve of the principal and sometimes it's not easy for DPs to exactly know how SF were spent. A few of the respondents on the other hand indicated that SF was used to acquire ICTs for integration in management processes. Oloo (2009) study corroborates this finding that SF supported the integration of ICT though minimally (22.20%) apportioned for maintenance. The principals advised the BOM on capacity building for teachers through which SF facilitated teachers' workshops and seminars like SMASSE for knowledge and skills acquisition.

Although schools are encouraged to initiate activities that generate funds, it could not be a generalized idea as this goes with age of the school. The current leadership is encouraged to be competent by showing innovativeness and principals work out ways and means to initiate SIGA to supplement other sources of funds. According to DPs, slightly over 50% of schools funded ICT integration through SIGA by purchasing ICTs while 12.3% was apportioned to human resources. Data from document analysis supported DPs responses that ICTs in some schools were acquired through farming. While this study agreed with Omukoba, Simatwa and Ayodo (2011) findings that through SIGA schools acquired one or more ICTs plus hiring and sustainability of ICT technicians, others had no SIGA projects due to age of the school, land acreage and enrolment.

The introduction of ICT integration had its own hurdles to settle in terms of costly device acquisition, security, maintenance, skilled personnel and technical support among others. This saw majority of schools lag behind in integration and to alleviate the problem, donors and well

wishers either voluntarily or on principals' request through proposal came through to support. This study however established that principals' involvement of donors and well wishers was more on equipment acquisition. Documents analysis data supported this finding on individual donors and well wishers' contribution of computers. Other individual donors and well wishers like BO chairpersons, sponsor and student alumni supported ICT integration through donation of devices an idea mostly initiated by principals' leadership mobilization skills. Data from document analysis and interview schedule in one school showed that a donor supported a DP for ICT training in a local university and others attended management course at KEMI through BOMC sponsorship,. The CAMARA Company supplier of ICTs under ESP trained teachers on how to integrate computers but this was only where computers were supplied.

Principals further involved politicians as stakeholders in integration of ICT as established through document analysis and observation checklist. Secondary education in Kenya was not devolved according to the constitution of Kenya 2010 but the political wing of County government provided funds for acquisition of ICT devices like computers, printers, photocopiers and installation of electricity to some schools.

4.7.3 Director of Studies' Responses on Principals' Involvement of Stakeholders in the Integration of ICT

Figure 4.15 portrays DOS responses on principals' involvement of stakeholders in the integration of ICT.

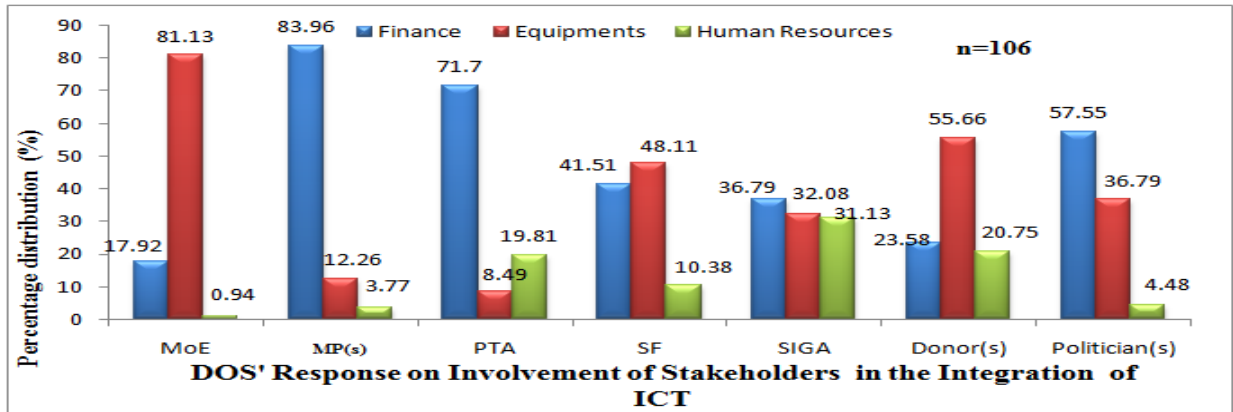


Figure 4. 15: Director of Studies’ Responses on Principals’ Involvement of Stakeholders in the Integration of ICT

Figure 4.15 demonstrates DOS responses on principals involvement of stakeholders in the integration of ICT where the MOE as indicated by 86(81.13%) majorly supported through equipment, 89 (83.96%) indicated MPs provided finance, 76(71.70%) cited PTA as providing finance, SF finance 44(41.51%) howed SF supported financially, 59(55.66%) observed that donors and well wishers supported integration in form of equipment while 61(57.55%) stated that politicians supported financially.

The DOS responses illustrated that only few schools received financial support from the MOE towards ICT at least from the total number of DOS that responded. Nevertheless, in PSS very few principals would discuss financial matters openly with their teaching staff so as for the DOS in this case to be in the clear picture. This was evidenced in document analysis such as BOM meetings where financial matters were discussed where DOS were never in attendance. The principals’ involvement of the MOE was for being PSS and showing the need for financial support although this should be taken with a pinch of salt as it is not always obvious. Schools that benefited from the ESP a government project was associated with MOE contribution towards ICTs, this was however made public to all staff members.

The MPs in the CDF procedures have made it public to all stakeholders on any form of contribution towards a project as area MPs would attract everybody in school and in some cases outside the school to make his contribution known. It was perhaps because of this transparency that best part of DOS cited financial resources as part of principals involvement of MPs. The CDF funds are hardly diverted to other school projects but this could have meant to facilitate construction of computer labs, installation of electricity and or acquisition of some ICT equipment. Observation checklist and document analysis revealed that indeed principals involved MPs in school projects like electricity installation, ICT labs through either fundraisings or proposal writing. Conversely, the MPs support was not directly towards integration of ICT in PSSM but through principals leadership, integration was somehow realized. Chesang, Okello and Kimitei (2016) study findings were convergent with this study that MPs contributed towards educational institutions variously where 24.2% agreed that CDF promoted provision of electricity to schools among other projects. In very small ways were MPs involved in supporting the human resource aspect with regard to ICT integration

The role of PTA in school development projects was in public domain where details in some schools were in the fee structure and other structures labeled as so. For this reason, respondents opined that principals' involvement of PTA saw the latter play a major financier role towards ICT integration in PSSM as opposed to direct support for equipment. Indirectly though, PTA funds purchase ICTs like computers, printers, photocopiers and general maintenance. Additionally, document analysis data revealed that schools hired personnel like teachers and technical support under PTA vote head guided by principals' leadership and innovativeness.

Many well to do schools economically speaking managed to support ICT integration in management from their SF. Under this category, few schools received finance, equipment and human resource support. Again on the issue of funds, it was far much away from the DOS to understand its usage in schools however, the equipment could be learnt of their acquisition perhaps from word of mouth or through staff meetings. Hiring of staff might not be really explained to DOS but document analysis revealed that human resource benefitted from SF through capacity building at SMASSE training and workshops and internal insets. Only 2.83% indicated that computer teachers greatly benefitted from their schools in terms of facilitation for ICT training. Principals therefore really committed SF to ICT integration by holding conversation with BOM to allow expenditures through an authorization minute to vire.

Although only few schools appeared to be supported through SIGA, there was evidence of support. A good number of PSS as established from document analysis and observations, had SIGAs such as cash crop farming, school bus and physical facility hiring for seminars and workshops and co-curricular activities. This study corroborated with Omukoba, Simatwa and Ayodo (2011) findings that such SIGAs supported school projects like computer acquisition among others. However, computers acquired as indicated in Omukoba *et al* (ibid) were for students taking computer studies and not for management *per se*. Data from document analysis revealed that some principals committed ICT entities like maintenance and remuneration of ICT technician to be catered for from SIGAs.

Donors and well wishers policy on open discussion of their support towards a school makes it easier for DOS to be in picture unlike those who confide in school leadership. Responses portrayed a picture that financial contribution from donors and well wishers was minimal compared to equipment support, a finding that agreed with data from principals' interviews and

document analysis. Some mentioned donated ICTs like laptops, computers, printers and website maintenance was openly discussed with staff members. On the other hand, it was observed that more often than not, individual well wishers and in isolated cases would one find corporate organizations supporting ICT integration. Since donor' support in most cases is shortlived, their part towards human resource was quite low but this did not escape DOS knowledge of donor support towards human resource. Donors facilitated some DOS for staff development programs in basic ICT use as was identified in some documents analysis data. This finding deviate from Muriko, Njuguna and Njihia (2015) finding that donors supported schools on ICT as only 5.19% were involved in supporting schools but agreed that donors support in ICT was depressing. Politicians too contributed towards ICT in schools whenever they were called upon especially during electioneering period however this study revealed that politicians' typically provided finance. For instance, the local government through their political initiative in rare circumstances supported schools by installing electricity as a requisite for ICT integration. In 2.22% of well established schools with ICT and maintenance were catered for by local politicians. Politicians would only come through networking and principals' verbal and or written requests as established through document analysis and interviews data.

4.7.4 Class Teachers' Responses on Principals' Involvement of Stakeholders in the Integration of ICT

Figure 4.16 presents class teachers responses on principals involvement of stakeholders in the integration of ICT.

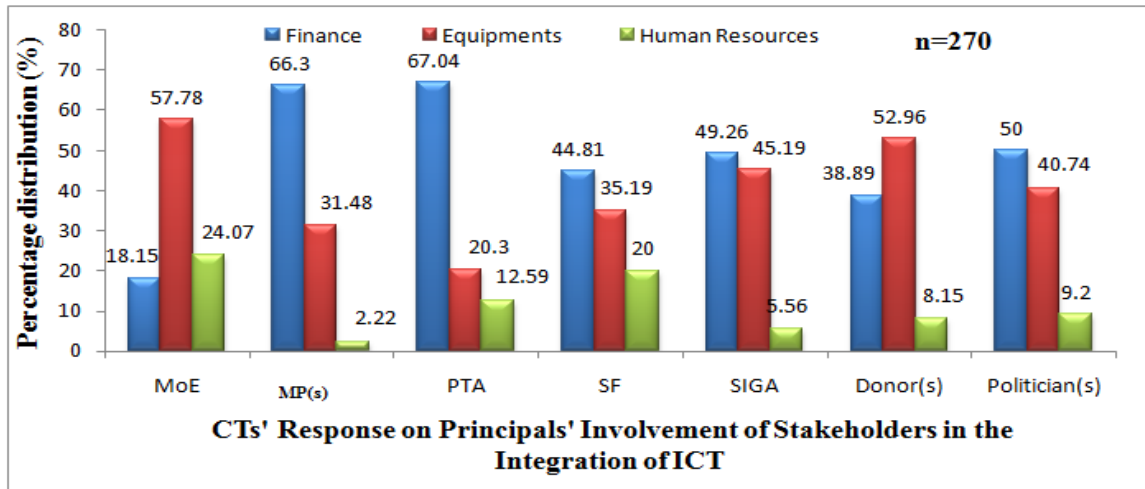


Figure 4. 16: Class Teachers' Responses on Principals' Involvement of Stakeholders in the Integration of ICT

The findings according to CTs responses in Figure 4.16 revealed that principals involvement of stakeholders led to MOE contribution of equipments indicated by 156 (57.78%), the MPs according to 179 (66.30%) provided finance, 181 (67.04%) indicated that PTA provided financial support, 143 (52.96%) cited donors and well wishers support through equipment and 135(50.00%)indicated that politicians provided financial support, while SF and SIGA support was below average.

In this information age, governments and other interested partners are motivated by the perception that ICTs have great potential in improving management services. Class teachers might not be privy to details on SF save in rare occasions which perhaps explains why only a minority cited finance as MOE support to schools on ICT. Some schools received ICT

equipment through ESP rather than funds hence the assertion that MOE supported schools in form of ICT equipment. Document analysis data revealed that principals involved MOE in funding schools for ICTs by making requests through proposal writing and indirectly through quality assurance and standards assessment report under challenges or immediate needs in the section of management. However, it was noted in the documents that not all requests made were honored by MOE.

Human resource is one of the areas that require attention for successful ICT integration; however respondents contend that the MOE contribution was low. Professional development seminars and workshops are important to encourage teachers and other ICT users to integrate ICT in management. The government of Kenya through SMASSE programs organized by CEMASTEAM and KEMI for management courses, offer professional development programs to benefit few teachers. Document analysis data indicated that schools sponsored teachers at sub county levels for such trainings and other INSETS outside school. Such funds came from MOE under capacity building vote heads.

The CTs' responses on MP involvement towards ICT integration painted a picture of transparency on CDF support at least on school projects. A good number of them observed that MPs contributed funds towards ICT integration either directly or indirectly. Data from observation checklist and document analysis such as BOM and PTA meeting minutes was a clear manifestation of MPs involvement through CDF kitty in school projects including computer labs. This study was in agreement with Mukiro, Njuguna and Njihia (2015) that only 5.19% acquired their ICTs through CDF support which implies MP involvement especially on ICT integration was negligible in some schools while in others it was so pronounced.

Document analysis data revealed that some schools received a nearly complete set of ICTs meant for computer students but not necessarily for management processes. In some schools, financial support was converted to equipment acquisition whenever there was need in which case CDF was indirectly involved. The inadequate ICTs noted in most schools to integrate in management system hence epitomize the glaring digital divide hence need for involvement of stakeholders for continuous support. The CDF support in Kenya is usually infrastructural rather than human resource development *per se*. This was evidenced in the findings where a negligible percentage identified CDF support towards human resource. This finding was partially similar to Abdelwahed (2016) findings which established that one of the major barriers to implementation of ICT in PSS in Sudan was lack of teacher competency and technical support. Human resource support in capacity building and qualified technical support lacked facilitation to integration.

There was a possibility that the government alone could not adequately fund school projects hence the need for principals to involve other stakeholders. The presidential working party on Education and Manpower Training for the Next Decade and beyond (Republic of Kenya, 1988) recommended that parents and community should supplement government efforts in educational institutions. As a matter of cost sharing policy, the support would be in terms of equipment and funds for the acquisition of teaching and learning material. In this study finding, PTA was outstanding in funding the integration of ICT in management functions which was in tandem with policy requirements on the role of PTA being to support schools. How PTA would be involved in ICT integration project was basically the principals' leadership to reach out to them convincingly through lobbying and making requests to the CDE to levy them.

The financial support from PTA was fundamentally used in the acquisition of ICT equipment, hiring of technicians and ICT teachers. More often than not, PTA carried a huge burden in

support of ICT projects in PSS. Document analysis data divulged that principals involved PTA as stakeholders in supporting integration of ICT through computer project where every parent was levied on agreed amount. Schools with higher enrolment progressed well with PTA contributions than new or old with low enrolment.

Principals' leadership is associated with establishment and sustainability of ICT integration in PSS. This could be done through SF contribution towards ICT integration. A below average mark of respondents posited that ICT integration support was through SF financially, equipment acquisition and staff hiring which impacted on principals' leadership. The findings revealed through BOM and PTA minutes that principals should budget for teacher capacity building and purchase of computer equipment. Such leadership falls back on SFs as administrative support, although school economic status determined reliability of SF capacity to support ICT.

Depending on the school location and land, school leadership are better placed to venture into school based economic activities that would yield good financial gains to supplement existing sources of school funding for ICT. This finding alluded to the fact that indeed nearly half of the sample schools supported ICT integration financially for equipment acquisition through SIGA which alleviated the burden from parents. According to Nyamwega (2016), Omukoba, Simatwa and Ayodo (2011) studies, SIGA sources were diverse but none was meant to support ICT integration in management. Contrary to the current study, schools with large farms had principals commit SIGA funds in acquisition of ICTs through BOM minute to allow for virement.

The role of donors in educational institutions is attracted by the needs of the school and the school leadership knowledge and skills to seek for donors and well wishers. Respondents indicated that donors and well wishers supported ICT integration mainly through provision of ICT equipment. Observation checklist and document analysis data in one school established that

the department was well established with computers from a donor organization. Some donations were from individual donors interested in school development, school alumni, BOM and organizations. Damkor, Irinyang and Haruna (2015) findings on the role of ICT in Nigerian educational system posit that various donors differently contributed towards ICT in schools. They cited the NEPAD project in secondary schools in Nigeria whose intention was capacity building in ICT to impart and enhance ICT skills to young Africans. While the NEPAD initiative similarly supported secondary schools in Kenya, this was not the case in the current sample schools. Abdelwahed (2016) study recommended for more external donors to support government policy on ICT integration in education especially in acquisition and maintenance.

Teachers role towards the program could not be over-emphasied. Teachers provided devices such as modems, laptops and even desktop computers back in their homes to be used in school management functions. In schools with meager resources, principals engaged teachers to use their personal ICT equipment to support integration of ICT. Teachers skilled in ICT were further involved as ICT technicians especially in the absence of the latter.

A country's political good will came in handy in establishment and sustainability of an institution. According to this study findings, politicians generally supported schools through provision of financial resources and ICT equipment. Contributions from politicians would be treated as individual contributions and not CDF where the latter is a government initiative. In line with the foregoing, Bray (1999) posit that a survey in 77 schools between 1997/1998 in Cambodia revealed that 40% of schools received school buildings from one or two politicians while others sponsored full constructions. Data from document analysis indicated that politicians hardly supported schools on ICT as individuals but took cover under CDF which was divergent to Bray (ibid) where the support was narrowed down to particular few schools.

In this study, it was observed that some schools successfully benefited from the county government in terms of ICT equipment which corroborated with Kukali (2013) findings that county government supported only a small number on ICTs. Politicians did not support secondary schools in Bungoma County in terms of human resource which covers staff hiring, remuneration and capacity building directly. In Kukali, Simatwa and Indoshi (2010) study, it was revealed that politicians supported principals who were actually their protégés and those known to them variously. The trio argued that political goodwill selectively extended their helping hand meaning however much a principal tried; some support was hard to come by.

4.8 Principals' Technology Leadership in ICT Use

The respondents were asked to indicate whether items under infrastructural, organizational and policy and culture changes were Not Available (NA), Available but Not Functional (ANF) or Available and Functional (A&F). The results were as in Figures 4.17- 4.19 for principals 'and Tables 4.16 -4.18 for DPs, 4.19-4.21 for DOS and 4.22-4.24 for CTs.

4.8.1 Principals' Responses on their Technology Leadership in ICT Use

Figure 4.17 depicts principals' responses on PTL in infrastructural changes made to enhance ICT use in management tasks.

4.8.1.1 Infrastructural Changes

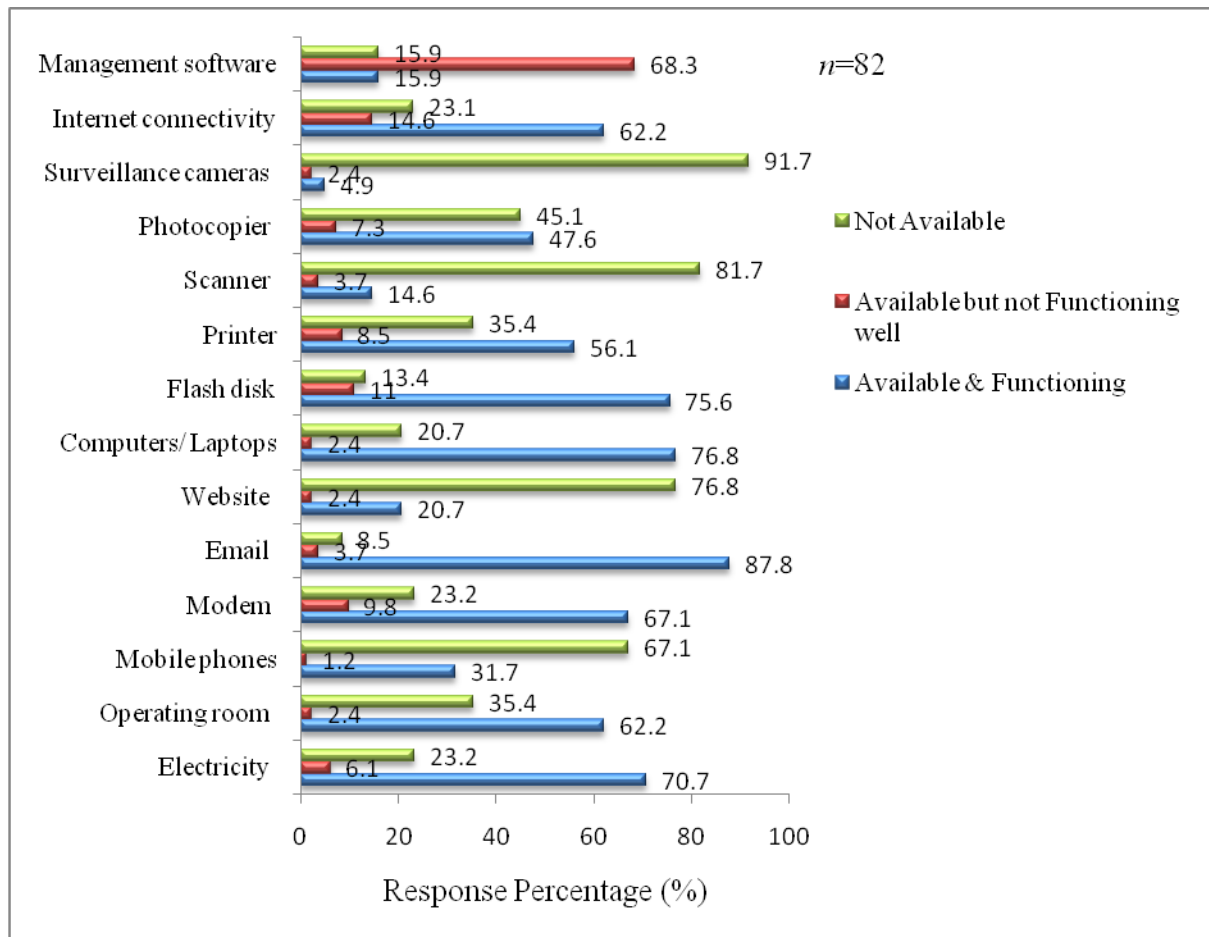


Figure 4. 17: Principals’ Responses on Infrastructural Changes

Figure 4.17 is a presentation of principals’ responses on infrastructural changes where 56 (68.3%) had dysfunctional management software, 51 (62.2%) had functional internet connectivity, 76 (91.7%) had no surveillance cameras, 67 (81.7%) did not have scanner(s), 62 (75.6%) had functional flashdisks, 63 (76.8%) had functional computers/ laptops, 53 (76.8%) did not have a website, 72 (87.8%) had functional school email address, 55 (67.1%) had functional modems, 55 (67.1%) did not have school cellphones, 51 (62.2%) of schools had operating rooms for ICT integration while 58 (70.7%) had functional electricity.

Results in Figure 4.17 indicated that principals made some infrastructural changes as required of technology leadership though not uniformly. The management software provides the school leadership ease to integrate ICT at various subsystems nonetheless, even with a good number having installed the software it was dysfunctional. Besides, while a few schools did not have management software, an equal number of principals observed that there were available and functional software in their schools. While this finding revealed that most schools had school management software which was partially functional, a greater part of the available ones varied from open tools software such as word processor, spreadsheet and in rare cases powerpoint.

In this digital age, the Internet plays an important role in connecting people, institutions and nations globally. However, some schools did not have Internet connectivity and those that had were dysfunctional. A principal observed “Internet connectivity is an issue here especially when it rains and that is why you can see we are connected yet dysfunctional. The service providers have failed us on this, instead rely on cyber cafe”. It was nevertheless encouraging to note that most schools had operational Internet connectivity notwithstanding inconsistent connectivity issues implying most schools embraced and valued Internet in management operations. Data from observation and document analysis corroborated this finding on Internet connectivity. This finding align with Mue, Itegi and Kyalo (2014) findings in which 38.7% observed that the Internet alongside computers were regularly used by administrators while 32.1% stated that Internet was used for communication within school and other institutions of learning. This signified that integration of Internet was gaining ground in PSSM.

Surveillance cameras come in handy as a security tool to schools and the ICTs therein. Majority of respondents indicated that schools did not have surveillance cameras while less than 3% had non functional and just less than 5% had functional ones. Principals who stated that their schools

had non operational surveillance cameras observed “ We purchased the other day and we are yet to install thus why they are not functional ”. Data from interviews corroborated by observation checklist and document analysis, portrayed a picture that PSS leadership in Bungoma County were yet to embrace surveillance cameras to enhance management efficiency. The security personnel were still relied upon as a source of security management checks. This finding aligned with Makhanu and Kamper (2012) which revealed that 188(100%) schools in western province did not have surveillance cameras. The duo recommended that with the current security issues in schools and the development of modern management systems of monitoring, principals should install surveillance cameras to assist in general management operations.

A photocopier enables management work cost effective at school level as it serves more than a single function. According to principals’ responses, the percentage of schools that did not have photocopiers and those with functional ones was nearly 50% except less than 10% that had but were not in working condition. It could be deduced that technology leadership made fairly satisfactory changes on the acquisition of a photocopier to integrate in management processes. Observation checklist and document analysis data established that photocopier machines available in schools were just one or two in number which were inadequate. This study was divergent from Quest, Kandjeo and Mushaadja (2014) findings which established that schools had other ICTs like printers, computers, overhead and LCD projector, digital camera, DSTV and Internet among others but not photocopier machine.

Successful integration of ICT majorly depends on PTL to bring about change in essential areas like infrastructure. Best part of schools did not have scanner(s), few had but they were not operational while a very small percentage had functional scanners. Principals’ technology leadership could be described as weak on the need for a scanner as part of the infrastructural

changes inspite of its uses. However this should not be interpreted to mean schools without scanners did not require their services but principals' instead outsourced services when need be. A principals asserted: We use cyber café to do scanning compromises confidentiality of school documents". In document analysis data agreed with interviews that lack of scanner and eventual use of cyber compromised document confidentiality. This finding resonated well with Makhanu and Kamper (2010), and Muchiri, Ndirangu and Kanori (2014) assertion that 147 (78.2%) and 60% of principals respectively did not have access to scanners in their schools while 41(21.8%) had. The latter argued that lack of scanners slowed down integration in administration as this meant outsourcing services. This borders weak principals' technology leadership on scanners as part of infrastructural changes.

The printer is not a stand alone type of ICT infrastructure yet very ideal in school management functions. The findings established that a good number of schools had functional printers, followed by those that did not have and lastly a few had but were not in working conditions. This means that PTL had a greater understanding of the value of integrating a printer in management activities. From document analysis and observation checklist, most beneficiaries of ESP had printers though some had broken down while the rest through PTL on infrastructural changes acquired through other means. This study aligned with Kukali (2013) assertion that sources of ICT acquisition were diverse and widely varied including but not limited to ESP and SF.

A flash disk is a portable ICT for integration in management that a technology leader with or without other ICTs would endeavour to purchase. Conversely, principals responses revealed that some few schools did not have, a smaller percentage had but defective while an impressive majority had functional devices. From document analysis it was noted that even with other ICTs, flashdisks were the most advocated for ICT to begin with. Flask disks still work even in the

absence of computers, printers and or photocopier because of its portability and storage capabilities. This implies that the best practice in integration is for PTL to ensure infrastructural change in obvious areas. A well thought out deployment of ICTs go along way in bridging institutions and other nations globally.

Most schools websites, a negligible percent had but dormant while few were functional. Lack or inadequate websites limit the school's capability to reach out to other institutions, organizations and people. This implies that availability of website in school was yet to be embraced as the older methods of making adverts through paper work, announcements on parade or during annual general meetings was at play. In one school the website was very active and the principals observed that it was funded by a well-wisher who further supported its maintenance. This finding supports Makhanu and Kamper (2010) that there was still a gap in principals' access to website which was not among the ICT software in their study findings. The few functional ones had their own share of challenges ranging from sustainability and frequent use.

The email is one of the very fast and modern day technologies for communication which school technology leadership should consider adopting given the nature of communications required of schools. In this study, very few schools did not have emails just as those that had but were not operational while majority of schools had email addresses. Principals from schools without email addresses indicated that they used personal ones in situations that required them to email information while those not in operations blamed it on lack of funds for sustainability. From the findings it's evident that most technology leadership recognized the email as a tool for communication among stakeholders and actually adhered to government directive of online operations. This finding did not correlate with Muchiri, Ndirangu and Kanori (2014) study findings where only 10% of principals used email since 20% of them were not techno savvy.

Modems are useful in the absence of Internet connectivity to access information from the Internet, websites and communicate through emails. In the Kenyan market, most modems vary depending on companies such as Safaricom, Airtel and Orange (Telkom) among others. Data obtained through document analysis revealed that most schools without Internet connectivity used modems for online services. Data obtained portrayed that even without Internet connectivity; most principals used modems to access information. A principal observed:

“The cost implications in Internet from installation, misuse by school staff and the bills are enough to think of modem as the way to go. The bills were crazy and I was like are we here to meet Internet bills and nothing else? It was too much for a struggling school like ours despite that we are working and working smart with our three modems”.

Despite these efforts, principals registered complaints about the frustrations they go through due to poor service provider let alone frequent power outages. That renders availability of a modem as an alternative of Internet connectivity almost unusable.

The cellphone has since the recent past become the most usable device among almost all cadres of people economically speaking. While it might sound weird to state that majority of schools did not have cellphones in this information age, through interviews and document analysis, the study established that majority of schools did not have school cellphones. Principals' personal cellphones which were labeled as school cellphones; only one principal indicated that the school had a cellphone which was not in working condition. The emerging phenomenon has landed on greater space because of its communication valuabilities in management circles. This study finding was divergent from Kimuyu, Kalai and Okoth (2016) study that 23(82.1%) had school cellphones yet 18(64.3%) affirmed use of school cellphones in management especially communication with stakeholders. They further observed that every school secretary had a school cellphone which was used with no mention of CTs.

The complexity of working technology is having an operating room for ICT integration effectiveness. However, some schools were stuck for lack of room for integration; a very small number had put up rooms which were not operational for some reason while a majority had operating rooms. Through interviews, it was revealed that such operating rooms included but not limited to computer rooms, DOS, secretarial pool or principals' office. Data obtained through observation demonstrated that technology leadership triability to integrate ICT in management as positively correlated with infrastructural changes but operating rooms were actually a major setback other factors notwithstanding.

There were many schools that had functional electricity as opposed to just few that were yet to install. There were other schools which were in the process of installation which eventually raised the number of schools with electricity. Even with electricity is viewed as a primordial provision for ICT integration among other functions. Besides, principals' leadership is fundamentally required to be mirrored in the context of a catalyst in ICT integration. Through observation it was noted that few schools without functional electricity were in electricity, Muchiri, Ndirangu and Kanoru (2014) observed that 20% of principals and 40% of DPs cited power outages as the main problem to integration.

4.8.1.2 Organizational and Policy Changes

Figure 4.18 presents principals' responses on PTL in organizational and policy changes augment ICT use in management activities.

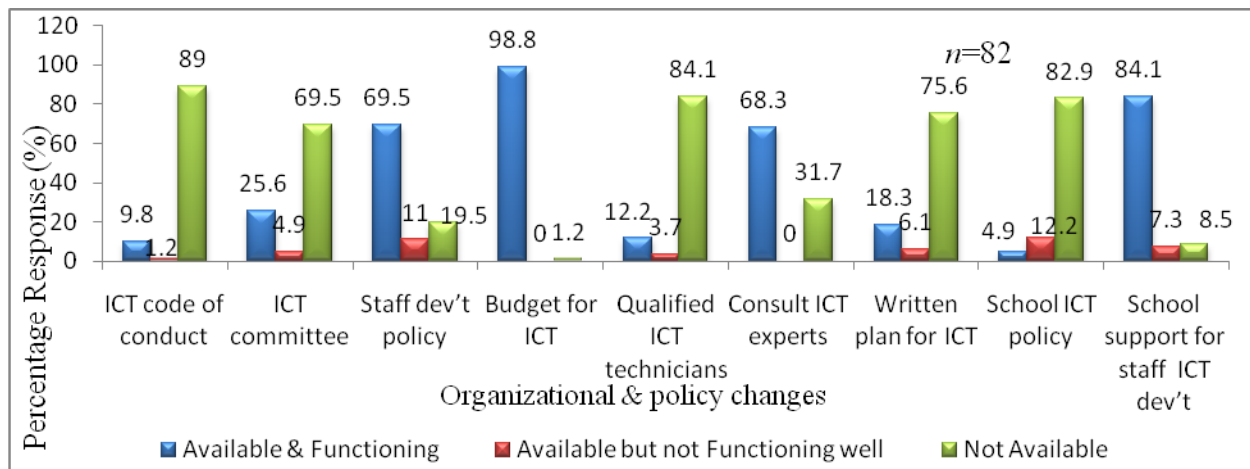


Figure 4. 18: Principals’ Responses on Organizational and Policy Changes

Principals’ responses on both organizational and policy changes were as in Figure 4.18. Major findings were 73 (89%) had no ICT code of conduct in school, 67(69.5%) did not have ICT committees, 57(69.5%) had a staff development policy, 81(98.8%) had a functional budget for ICT, 69(84.1%) had no qualified ICT technicians, 56(68.3%) schools consulted ICT experts, 62(75.6%) had no written plans for ICTs, 68(82.9%) had no ICT policy while 69(84.1%) had functional school support for staff ICT development.

The establishment of ICT in a school set up requires the principal to consider substantial organizational and policy changes that essentially support appropriate integration of ICT for better service delivery in management. The principals’ responses together with data from document analysis on organizational and policy changes revealed that a greater part of schools did not have an ICT code of conduct while just a small percentage had. This meant that technology leadership failed in putting specific guidelines for ICT integration in schools which formed basis for an unavoidable failure. Technology leadership requires the principal’s efficacy to make necessary changes to facilitate effective ICT integration rather than allow room for inertia among staff. Those aware of the importance of ICT code of conduct observed:

“ICT code of conduct is a must if discipline has to prevail among staff users. For instance flash disks should not be allowed from outside school for this is the essence of viruses in computers. The effect would be data being lost and funds would be required on re-programming”.

This study disagreed with Kiptalam and Rodrigues (2010) findings that 64% of schools had an ICT code of conduct that assisted in regulating ICT usage in schools. Technology leadership role ensures ICT sustainability and maintenance hence the need to initiate an ICT code of conduct to regulate device usability.

Successful integration of ICT in institutional functions sometimes is faced with issues that require specialized teams to identify and report to relevant authorities. In the current study finding, schools had no ICT committees in place, a few had functional while a negligible number had dormant ones. Principals in their technology leadership who understand the benefits and value of ICT integration in management strive to implement essential changes to propel success of the program. Data from document analysis showed that some schools had ICT committees in place but more in theory than practice hence failure to contribute to improved execution of management activities.

The emergence and newness of ICT knowledge economy radically changed traditional knowledge system of status quo to periodic staff professional development programs. To keep abreast with new developments, a technology leader initiates staff development policy to match theory and practice. A greater part of schools developed staff development policies, few had in theory with some lacking. Some Principals with dormant policies observed that they were willing to support teachers as documented but they found themselves at crossroads. For instance some teachers were unwilling and complained of lack of time to go for such trainings while others stated that the shoe string budget that schools operated on could not allow them support teachers

over the same. Functional staff policies were attributed to part of teacher motivation to embrace ICT which consequently improved their competence. Documented information however showed most teachers who were beneficiaries of ICT staff development policy were for SMASSE program. Conversely, Shihundu and Luketero (2014) established that only 24.2% of schools offered other professional development opportunities related to ICT as opposed to 75.8%.

School budgets fundamentally provide guidance and restriction on the expenditures as planned. Interestingly, available and functional school ICT budgets were the most successful components of technology leadership evidenced in most schools with or without ICTs. Principals as technology leaders view budgeting for ICT as a catalyst towards ICT integration in management. Even with ICT budgets in almost every school, principals complained of inadequate funds to facilitate TCO for integration, an assertion that Laaria (2013) and Sessional Paper No. 1 of 2005 (MOEST, 2005) seem to concur with. However, data from document analysis indicated that there was an increasing body of evidence that could hardly sustain the practicality of such ICT budgets. This implied a mismatch between ICT budgets on paper and the actual requirement.

The advancement of new technology in the market creates some incompetence among users especially with the unknown troubleshooting issues. According to this finding, a small percentage of schools had qualified ICT technicians, but the undoing was that they were hardly engaged for what they were hired for. Through observation checklist, it was noted that some schools had broken down ICTs like computers, printers and photocopier machines stored in a room somewhere. A principal argued “Hiring a qualified ICT technician is costly thus why I prefer a certificate holder or simply outsource experts”. This study finding concur with Kimuyu, Kalai and Okoth (2016) study which established that 57.1% of the schools did not have qualified ICT expert as opposed to 42.9% that had. The trio argued that this was not a big deal as indicated

by 25% since principals had the option to outsource services which disagreed with the current findings which through interviews and document analysis were an option but rated as costly. The PTL requires focus on maintenance to influence changes in technical support skill base which was lacking. Lack of administrative support and technical support negatively pulled down technology leadership attempts to integrate ICT in teaching. This implies that ICT technicians are a critical resource in ICT integration plus principals' support.

The integration of ICT is sometimes faced with troubleshooting problems that end up frustrating less skilled users. Many would shy off to avoid further embarrassing situations however with an ICT technician in school; the allayed fears would be short lived. A good number of principals consulted ICT experts from outside whenever there was need while a minority did not. Respondents opined that consulting experts arose in the case of a complex issue. Some schools had quite a number of broken and functional ICTs stored in unused room meaning the idea of consulting experts or outsourcing was not as fruitful. Embracing ICT enabled users to be aware of the importance and need for trust in their role performance as technology leaders to uphold expertise in equipment sustainability. Contrary to Shihundu and Luketero (2014) finding, 84.2% rarely and never used outsourced experts. This implied either the schools had no ICTs or hired ICT technician.

As the world rapidly advances in technology, principals are undoubtedly trying to appear relevant to this development by facilitating the process at school level. Among other strategies to bring about change is to have an ICT written plan for the school which serves as a benchmark upon which reference is made to monitor and evaluate what is and what is not in place. Unfortunately, there were few schools with functional ICT written plan and even fewer had functional ones while many did not have any in place. This implied that principals in their

endeavour to integrate ICT in management lack the desired expertise to position themselves as technology leaders. The articulation of ICT plans did not translate into implementation which is an indication of an evident gap between theory and practice with regard to ICT plans.

National governments that strive to cope up with the technological world; formulate policies to provide a road map to the establishment. Similarly, school technology leadership as a critical component of the principal's leadership develops ICT policies to strategize successful ICT integration in management. The findings revealed that less than 5% of schools had a functional ICT policy; others had a dormant policy while a great percentage had none. This implied that principals lack technology leadership capacity to recognize and develop a workable ICT policy. The rationale expected to be set out from the ICT policy for ICT integration such as ICT infrastructures required had at most failed. A principals observed: "We don't have a functional ICT policy because most of our activities rely on cyber café". The ICT technicians were hired among other roles to support the principal in formulation of school ICT policy since lack of it was an opposing factor to ICT integration. However, Kimuyu, Kalai and Okoth (2016) study revealed that 89.3% of respondents did not approve support to formulate school ICT policy.

A technology leader works out to support staff in ICT development. In this study schools supported staff in ICT development with minimal number lacking such program. The introduction of ICT integration viewed as a new venger with inadequate and or lack of knowledge and skills as an immediate need to be addressed. School ICT users therefore need capacity building to enable them acquire knowledge and skills for effective integration since most of them were limited in knowledge and skills. From document analysis data on ICT staff development, there was discussion of such staff development however, records on staff establishment did not indicate practical support. This study resonates well with Oluoch, Ajowi

and Bosire (2015) findings describing knowledge and skills in ICT as very important. In improving staff support, the trio opined that 85% organized workshops and seminars for staff while 65% did through sensitization based on the premise that most staff members were ICT illiterate. This means that principals in their leadership comprehend the value of support staff in ICT development for purposes of enhancing efficiency. While such progression is an indication of an increased awareness in view of ICT integration, Shihundu and Luketero (2014) asserted that only 8.4% received staff support in training against 91.6% without. Lack of staff support sometimes would translate into resistance to organizational change.

4.8.1.3 Culture Changes

Figure 4.19 illustrate principals’ responses on PTL in culture changes improve ICT use in management activities.

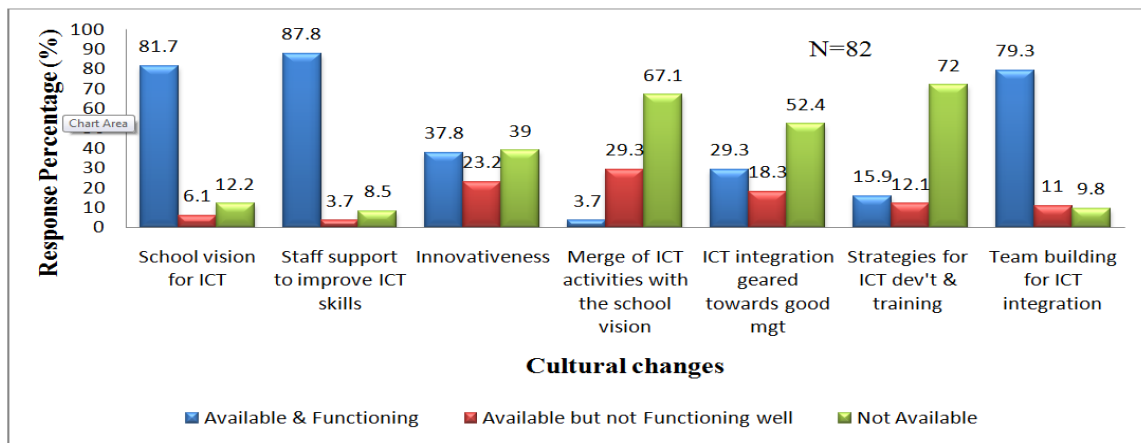


Figure 4. 19: Principals’ Responses on Culture Changes

On culture change to enhance ICT integration the results from principals were as in Figure 4.19 and major findings were that 67 (81.7%) had a functional school vision for ICT, 72(81.7%) schools had functional staff support to improve ICT skills program, 55 (67.1%) has not merged ICT activities with the school vision, 43(52.4%) did not have a functional ICT integration

program geared towards good management, 59(72.0%) had no strategies for ICT development and training and 65(79.3%) had functional team building for ICT as a form of culture change.

In the Kenyan system of education, schools are encouraged to formulate school visions through which they are guided in their activities. Similarly, to integrate ICT in school management, principals in their technology leadership under culture change formulates a school vision for ICT to provide guidance in choosing the right path for integration. Many of the schools had come up with a functional vision for ICT integration as was evidenced through document analysis; a minimal number had but was yet to be operational while a small number for some reason simply never had any. Accordingly, a vast of schools passionately changed or formulated vision for ICT integration as a matter of culture change to enhance integration. Adu and Olatundun (2013) espoused that a clear vision for ICT is necessary to enable the leadership make decisions on integration and management of ICT in schools guided by wisdom. A deeper understanding of why school technology leadership should consider vision for ICT is because it's increasingly becoming an inevitable tool for effective management.

The newness of technology has rendered most staff members illiterate in the area which then calls on technology leadership to support staff improve their ICT skills. According to principals responses, most schools had in place a program that supports staff to improve on ICT skills as opposed to those with it on paper and none at all. For instance a principal stated:

“The kind of support we provide includes peer tutoring. we encourage our teachers to work with our ICT technician or with a colleague as they practice integration. This has yielded fruit as even without formal training, they are competent in integrating ICT”

This is an indication that the principal's technology recognizes the importance of technology savvy professional for effective integration. Some of the common methods used to support staff

development in ICT integration included peer support, seminars within the sub county and use of ICT experts. One ICT expert companies that supplied computers to some schools across the county namely CAMARA mounted a week long training session for teachers on computer integration in curriculum delivery. This bore fruit as majority obtained basics on integration in curriculum which was further used in management.

The onset of ICTs in schools more often than not knocked at the doors of most schools unprepared for integration as a result technology leadership had to think innovation variously. Although this study established that only few principals were innovative in ICT integration in management, very small percentage penned down innovative ideas which were not operational and a relatively slightly higher percentage had not innovated anything in line with ICT integration. This perhaps explains why some schools had some ICTs especially computers but because of room, accessing the equipment posed a challenge to teachers. To shape the progress of integration, PTL plays a central role in making ICT a discussion issue on innovativeness it various forms including infrastructure, professional development, attitude change and time for ICT among others.

The role of ICT activities is meaningful when merged with school vision however according to this study finding, school technology leadership only merged ICT activities with school vision in few schools as over half of the schools did not observe this culture change. The efforts to merge ICT activities and school vision could be interpreted to mean that the efforts were still at a developmental stage to establish culture change from administrative status quo. The apparent gain in the enhancement of this component of culture change could be attributed to uninformed technology leadership leading to failure to consider merging ICT activities and school vision. Some principals stated:

“We don’t have an ICT school vision and the purpose of integrating ICT in management basically is to enhance work performance. We are still struggling to have stuff in place let such apply to well established institutions but we have it on paper”.

Despite the fact that most principals were in cognizant of the role ICT in management functions, divergent views emerged about flaws in technology leadership to promote culture change in this context. In this spectrum, there is every reason to impart knowledge and skills on the importance of merging ICT activities and school vision among principals to cascade knowledge.

Integration of ICT in management improves good service practice by exercising management skills in dynamic ways to prepare for digital challenges. Majority of schools failed to change this culture component. Although majority of schools failed to change some principals espoused that the purpose was well intended but other factors notwithstanding could mess the intention. The digital divide played a big role in terms of knowledge and skills, accessibility, infrastructure in terms of hardware and software and technical support. Total shift from these issues could not uniformly make it workable for developing schools which were the majority.

In many of the schools ICT integration in management activities would require the principal as a technology leader to embrace collective responsibility in putting strategies in place for ICT development and training among staff as a matter of culture. It was observed that few principals had a functional layout of strategies for ICT development and training; few had such strategies just on paper while a huge percentage had no strategy at all. This means principals’ technology leadership was a little weak on this aspect as ICT and training was not given the attention it deserved. For this reason, many schools were limited in several essentials for ICT integration such as training, infrastructure and operational room among others. The type of training determines the effectiveness in ICT integration as less ICT skilled would present themselves as incompetent hence wearing out their confidence.

Team building as an aspect of culture change was doing well as most respondents indicated that it was available and functional. This was a reflection of collective responsibility to ensure the success of ICT integration. The idea of team building as a strategy has the potential to expedite ICT integration regardless of one's level of knowledge and skills in ICT integration. Team building instills confidence and change of attitude to enhance positivity towards ICT. Respondents observed that teachers ICT knowledge and skills had been a hands on kind of training and not formal *per se*. The few schools that either had none working teams or no teams were either among those without ICTs or were beginners. Adu and Olatundun (2013) in their study argued that as one of the strategies, principals need to set up teams with varied skills and competencies to support less skilled members. This finding concurs with the current study on the importance of teambuilding to enhance ICT integration.

4.8.2 Deputy Principals' Responses on Principals' Technology Leadership in ICT Integration

Respondents responded to a questionnaire on PTL in ICT use in management tasks in their offices where Available & Functional (AF), Available but not functional (ANF), Not Available (NA) were adopted. P=Probability value and V is Cramer's value for measuring the effect size. Table 3.4 on page 84 in chapter three indicates intervals for Cramer's V effect sizes interpretation. The interpretation of effect size was applied in Tables 4.16 - 4.18.

4.8.2.1 Infrastructural Changes

The DPs responses on whether principals as technology leaders made infrastructural changes towards ICT integration were as in Table 4.16.

Table 4. 15: Deputy Principals’ Responses to Infrastructural Change

Infrastructural changes (n=212)	AF <i>f</i> (%)	ANF <i>f</i> (%)	N.A <i>f</i> (%)	χ^2	P	V
Electricity	130(61.3)	30(14.2)	52(24.5)	78.151	0.041	0.43
Operating room	25(11.8)	12 (5.7%)	175(82.6)	45.123	0.000	0.33
Cellphones	212(100)	0(0.0)	0(0.0)	-	-	-
Modem	45(21.3)	152(71.2)	15(7.1)	2.670	0.263	0.08
Email	174(82.1)	25(11.8)	13(6.1)	227.670	0.085	0.73
Website	20(9.4)	47(22.2)	145(68.4)	122.443	0.063	0.54
Computers/ Laptops	126(59.4)	66(31.1)	20(9.4)	79.962	0.041	0.43
Flash disk	144(67.9)	19(10.0)	49(23.1)	20.726	0.704	0.22
Printer	140(66.0)	15(7.1)	57(27.9)	20.726	0.862	0.22
Scanner	52(24.5)	27(12.7)	133(62.7)	86.896	0.402	0.45
Photocopier	103(48.6)	64(30.9)	45(21.2)	22.255	0.647	0.23
Surveillance cameras	2(0.9)	1(0.5)	209(98)	323.330	0.156	0.87
Internet connectivity	52(24.5)	17(8.1)	143(67.5)	19.977	0.001	0.22
Management software	20(9.4)	153(71.2)	39(18.4)	146.443	0.038	0.59
Average Effect Size						0.41

Key: AF=Available and Functioning, ANF=Available but Not functioning, NA=Not Available

Table 4.16 presents results from DPs responses on PTL in ICT use. The findings revealed that there was a statistically significant relationship between PTL and electricity ($p=.041$), operating room for ICT($p=.000$), computers and laptops ($p=.041$), Internet connectivity ($p=.001$)and management software ($p=.038$).

The study further indicated there was no statistically significant relationship between PTL and Modem ($p=.263$), Email($p=.085$), website ($p=.063$), Flashdisk ($p=.704$), printer ($p=.862$), scanner ($p=.402$), photocopier ($p=.647$), surveillance camera ($p=.156$) use in management functions in DPs office.

The findings indicated that electricity is a major requisite for ICT integration. From document analysis and DPs’ responses, majority of schools acquired electricity through KREP but at different stages thus why some were available but not functional. It was observed that electricity was not available especially in new schools where other priorities were considered. This study disagreed with Oluoch, Ajowi and Bosire (2015) study that 53% of schools lacked electricity.

Conversely, the current study concurs with Makhanu and Kamper (2012) where most principals (63.3%) accessed electricity in their schools. Schools with electricity were in a better position to integrate ICT in management power outages notwithstanding. There was a statistically significant relationship between available and functional electricity and PTL in ICT use in DPs office at the 0.05 significance level. This was evidenced by significant P-value ($\chi^2 = 78.151$, $P = .041$) and effect size ($V = 0.43$), which according to Cohen's (1988) standard effect size classification was large. The strength of the relationship between available electricity in schools and PTL for ICT integration in DPs office was very high signifying its importance.

In DPs' responses, most schools did not have operating rooms implying that even with available essential ICTs operating rooms were issues to be addressed. The high percentage of schools lack operating rooms for ICT integration signified lack of technology leadership to innovative as indicated by the lowest number that had dysfunctional. From observations, it was established that majority of schools with operating rooms were actually computer rooms and not necessarily rooms for teachers to use for ICT integration. Some schools had ICTs but lack of room inhibited accessibility. Document analysis revealed that most schools with computer rooms were beneficiaries of ESP put up for students taking computer studies and not necessarily administrative functions per se. The school technology leadership is a major parameter for establishing infrastructural change process to accommodate ICT integration. Lack of an operating room borders none innovative technology leadership to systematically integrate ICT. There was a statistically strong significant positive relationship ($\chi^2 = 45.123$; $P = .000$) and the effect size ($V = 0.33$) was medium on an operating room and PTL in ICT use in management tasks in DP' office. It however means that available and functional room would on average enable the principals to integrate ICT in management in DPs office.

About cellphones, all respondents indicated that schools had mobile phones. Contrary to principals responses and data analyzed from documents, only 26(31.7%) had available and functional school cellphones. Otherwise most of the cellphones used as school phones belonged to principals (personal) just as other staff members used their personal gadgets. It means communication on the principals' side would be effective while DPs on the other hand were provided with airtime for communication with personal phones on school matters. In this section, the relationship was not computed since the entries about availability of cell phones were constant; hence chi-square could not be calculated. However, with available cellphones, DPs communicate effectively by making calls, sending automated texts to multiple recipients or use Internet services on smart phones.

There were many schools with available and functional modems compared to those that did not have. Principals made effort to make this infrastructural change a reality knowing how valuable it was in the absence of internet connectivity. This implied that PTL was cognizant of the importance of a modem as part of the infrastructural changes with or without internet connectivity. Through observation checklist it was noted that some schools had no computers and having a modem would not assist but instead visited cyber cafe instead. There was a statistically significant relationship between available and functional modem and PTL in ICT integration in DPs office where ($\chi^2 = 2.670$; $p = .036$) was significant at 5% level of confidence interval,. The effect size (V) = 0.08 was small implying that even without Internet connectivity and a modem would do. If need for Internet arises, principals can opt to access Internet through cyber cafe for emails and Google for professional information among others.

According to responses, most schools(82.1%)had functional emails. The highest percentage might have been guided by most government bodies like TSC, MOE and KRA that require online transactions dictating every school to have an email address. Few schools without emails were either newly established or used principals' personal email. This study finding concurs with Afshari, *et al*(2010) finding that principals frequently used email for sending and receiving emails (46.9%). They further argued that most principals owned school emails on their cellphones and home contrary to the current study finding that focused on establishing whether there were school emails. There was a statistically insignificant relationship between PTL($\chi^2=227.670$; $p=.085$) and effect size ($V = 0.73$ being large integrating email in management functions in the DPs office since probability value is more than the critical point $p=.05$. This means that emails have large effect on PTL in ICT use in DPs office given that emails were mostly done by the school secretary or under delegated duty by DOS. This study did not partially agree with Makhanu and Kamper (2010) study that there was non significant weak positive relationship ($P=.05$) between access to school telephone and school performance.

Websites have since the recent past become part of the school ICT software through which communication with the outside world could be realized. In this study, only few had functional and or no websites. The ostensible enhancement of infrastructural change could be attributed to poor technology leadership especially in fairly established schools that should be marketing their institutions to wide community. An actively operational website turns out to be the best source of information about the school even before using any other mode in obtaining school information. The fact that majority of schools did not have websites as precursor for visiting schools, limits consumers in decision making about the school. There was an insignificant relationship ($\chi^2=122.443$; $p=.063$)and effect size ($V =0.54$ being large. These results indicate that despite

the importance of the school websites in the modern day today, the role of websites was taking too long to be realized in most PSS. This study corroborated by Muriko, Njuguna and Njihia (2015) study established that 67% of the schools had no websites against 33% that had. Some earlier studies had however alluded to the fact that maintenance of a website required funds which most of the schools were not able to raise due to other demanding basic needs. During interview schedule, a principal quipped“ websites are costly and with megre finances, it is rather heavy on us as a school but we as a school are lucky to land a well wisher who has been supporting us for maintenance. It was uncommon in most schools to come across a document where school website was discussed.

The computer/laptop is probably the main ICT hardware mostly known in this information age. In this study, slightly half of schools had computers or laptops, followed by not functional. Although the number of schools with functional computers or laptops was slightly above average, Oluoch, Ajowi and Bosire (2015) study, 100% DPs cited inadequacy of ICTs at departments. Similarly, Muchiri, Ndirangu and Kanori (2014) observed that 80% of DPs had no Internet connected to school computers in their schools while only 20% reported in the affirmative. It did not escape the understanding that Internet connected computers too suffered regular power outages consequently fall back on outsourcing sources. There was a statistically significant relationship between available and functional computer or laptop and PTL in ICT use in DPs offices where ($\chi^2=79.962$; $p=.04$) and the effect size (V) =0.43 was large. From the interviews and in some instances through document analysis, it was established that some computers meant for computer students were converted into management functions.

Flash disks would still be integrated in management activities even without other complimenting equipments. In this study 67.9% of responses indicating availability was high compared to 23.1% portray the intention to integrate ICT in management despite other inhibiting factors. There was a trivial relationship between available and functional flash disk and PTL in ICT integration of ICT in DPs office, where ($\chi^2=20.726$; $p=.704$) and effect size (V) =0.22as medium. Although the flashdisk was considered important because of its portability, its not so important but on average enhanced PTL in ICT use in DPs office management activities.

Schools with available and functional printer(s) were the majority which gave value of the equipment in school management functions. Printer is equally costly and for starting schools and those with low enrolment might face financial constraints in TCO. Schools without printers hired cyber cafe services, borrowed from neighboring schools which was a bit cumbersome and had a bearing on document confidentiality besides delays. From observation checklist most printers were in the principal's office with the secretary or in the office of the DOS. Contrary to this finding, Muchiri, Ndirangu and Kanori (2014) asserted that 60% of schools had no printers as per DPs responses. There was a statistically insignificant relationship between available and functional printer and PTL in ICT integration in DPs office where ($\chi^2=20.726$; $p=.862$) and effect size(V) = 0.22 being medium. This means that even though printers play an important part in transacting management activities, a school with a single computer/laptop could still do its work instead of seeking for printing services elsewhere.

According to DPs, most schools had no scanner(s) however observations revealed that scanner(s)was integrated in the DOS office and secretarial pool. Lack of scanners meant falling back on cyber café services which in essence contravenes school document confidentiality.

There was a statistically significant relationship between available and functional scanner and PTL in ICT use in DPs' office where ($\chi^2=86.896$; $p=.402$) and the effect size (V) = 0.45 as large. This indicates that for PTL to integrate the scanner in DPs office management activities, scanners have a role to play. During observation and interview schedule with principals, it was observed that scanners were mostly used in the DOS office.

Photocopier machines were available and functional in more schools perhaps because of its cost effective nature where huge sum of material require printing. The apparent gain in the enhancement of photocopier machine as an infrastructural change could be associated with its functions which include photocopying of printed material. There was a statistically insignificant relationship ($\chi^2=22.255$; $p=.647$) between available and functional photocopier in the school and PTL in ICT integration in DPs' management activities and effect size (V) = 0.23 being medium. This implied that although photocopier is an important ICT in DP's office, technology leadership must have been guided by school priorities. For instance observation checklist data, DPs offices did not have photocopier instead used what was available in other offices.

According to DPs responses, surveillance camera was only found in 2(0.9%) schools and functional 1 (0.5%) had but not functional while a whopping 209 (98.6%) did not have any. During interviews, it was observed that principals were weary of cost implications on surveillance cameras but appreciated their importance on matters security. Through document analysis it was noted that at least three schools had shown interest but pressed down by costs and skilled personnel to retrieval data. This study disagreed with Makhanu and Kamper (2010) that no principal in western province accessed a surveillance camera. A technology leader in this information age considers Digitilizing School monitoring process by enhancing security through

surveillance camera. Divergent to the current study, Garver and Naguera (2012) study established that some community members favoured surveillance cameras to improve security while others found it ineffective. In the same breath, 24.60% of students argued that increasing security officer's guaranteed their safety in schools while 15.10% favoured increase in security cameras to enhance their security. From the foregoing, there was notable lapse in technology leadership to embrace surveillance cameras to provide leadership for developing commitment to infrastructural change. There was an insignificant association ($\chi^2 = 323.330$; $p = .156$) and with effect size (V)=0.87 being large between surveillance camera and PTL for ICT integration in DPs offices in management. The insignificance outcomes could be attributed to the notion that surveillance cameras are a new concept in school management yet the security personnel approach was still in place.

Data on Internet connectivity changes showed that majority of schools did not have available and functional internet connectivity. The scenario on Internet connectivity as infrastructural change explains why most schools had modems and flash disks translating into minimal Internet role, high costs of sustenance and poor service provider notwithstanding. Kimuyu, Kalai and Okoth (2016) study concur with these findings that most schools had no Internet connectivity because of high fees charged by service providers plus slow connectivity. Lack of Internet was a hindrance to integration of ICTs like computers, laptops, email and cellphones for communication.

There was a positive relationship ($\chi^2 = 19.977$; $P = .001$) between Internet connectivity and PTL in ICT use in DPs office and a medium effect size (V)=0.22. The Internet on average is an

important tool towards ICT integration as most transactions at national level offices such as KCSE registration and confirmation, TPAD and KRA returns among others.

This study established that the sampled schools did not have functional management software which provides a chance to principals to track management with other subsystems but rare as majority were dysfunctional. Data from documents revealed that purchased management software which broke down faster than expected. This raises more questions on principals' efficacy in ICT or the level to which technical support were in control. There was a statistically significant relationship ($\chi^2=146.443$; $p=.038$) and effect size (V)=0.59 being large between available and functional management software and PTL in ICT use in DPs management tasks. Software enhances the health working of other ICT tools such as computers because they are mutually exclusive to one another, implying that although management software was either dysfunctional or simply not available, had an effect on ICT use in intersystem operations.

4.8.2.2 Organizational and Policy Changes

To analyze the relationship between PTL in ICT use with regard to organizational and policy changes, DPs responses were as shown in Table 4.17.

Table 4. 16: Deputy Principals' Responses on Organizational and Policy Changes

Organizational and Policy Changes ($n=212$)	AF $f(\%)$	ANF $f(\%)$	NA $f(\%)$	χ^2	p	V
ICT code of conduct	12(5.7)	78(36.8)	122(57.5)	82.755	0.670	0.62
ICT committee	33(15.6)	80(37.7)	99(46.7)	32.670	0.000	0.39
School ICT policy	55(25.9)	34(16.0)	123(58.0)	61.255	0.619	0.54
Budget for ICT	182(85.8)	20(9.4)	10(4.7)	121.811	0.010	0.57
Qualified ICT technicians	21(9.9)	66(31.1)	125(59.0)	76.991	0.573	0.60
Consult ICT experts	119(56.1)	33(15.6)	60(28.3)	54.745	0.741	0.51
Written plan for ICT	11(5.2)	58(27.4)	143(67.5)	126.689	0.705	0.77
Staff development in ICT	122(57.5)	69(32.5)	21(9.9)	72.236	0.265	0.58
Average Effect Size						0.57

Key: AF=Available and Functioning, ANF=Available but Not functioning, NA=Not Available

Table 4.17 depicts DPs responses on organizational and policy changes and the findings indicated that an ICT committee ($p=.000$) and budget for ICT ($p=.010$) had a statistically significant relationship between PTL and ICT use in management activities in DP's office since ($p<0.05$). Conversely, ICT code of conduct ($p=.670$), school ICT policy ($p=.619$), qualified ICT technician ($p=.573$), consultation of an ICT expert ($p=.741$), written plan for ICT ($p=.705$) and staff development in ICT ($p=.265$) had a statistically insignificant relationship between PTL and ICT use in DP's office.

In this study, schools had no code of conduct than any other category. This implied ICT integration in most schools was free for access without any restrictions such as use of unscanned flash disks, CDs and watching of funny videos rather than using available ICTs for intended management purposes. Integration of ICT brings about an overhaul to change operating systems including time management so as to integrate relevant ICTs according to structured time table. This was similar to an ICT code of conduct which provides guidance on when to access computer laboratory. The ICT code of conduct is an important plan that limits teachers' wastage sometimes on computer activities like games.

This availability of ICT code of conduct was insignificant ($\chi^2=82.755$; $p=.670$) in relation to PTL in ICT use in DPs' office and effect size (V)=0.62 was large enough to affect use. Despite the critical role the ICT code of conduct plays in device maintenance and sustainability regarding virus infections and Internet misuse, PTL were yet to embrace it to considerable levels.

The availability of a functional ICT committee has advantages in assisting the school principals identify ICT needs and performance in the area among others. However, according to this finding, the status of ICT committees in most schools could be interpreted as unsatisfactory since

many either had it merely in theory than practice or did not simply have. During document analysis, ICT committees were in place even with a dearth of ICTs. There was a significant relationship ($\chi^2=32.670$; $p=.000$) between ICT committee and PTL in ICT use in DPs office where the effect size (V) =0.39 was large enough to be relied on in drawing conclusions. Although ICT committees contribute towards establishment, usability of required devices and as principals' ICT advisory team, PTL on organizational and policy change was undermined by understaffing, lack or inadequate ICTs and skilled technician on actual roles.

The school ICT policy helps technology leadership in providing administrative support to staff through capacity building in the area of ICT which also encourages members to integrate ICT. Adebi-Caesar, Offei and Donte (2012) study agreed with this finding where majority (90.7%) were not trained while (9.3%) were trained. This study portrays school ICT policy as weak in organizational and policy change. This study established that there was a statistically insignificant relationship ($\chi^2=61.255$; $p=.619$) at 5% confidence interval and effect size (V) =0.54 being large; between school ICT policy and PTL in ICT use in DPs management tasks. Data from document analysis revealed that school ICT policies in most schools were merely in theory than practice and at the principals' discretion to implement. However, data from interview schedule indicated that staff were supported to attend seminars, workshops or INSETS and mostly facilitated for inter school, subject or sub county. Staff with belief systems that one must undergo formal training to use ICT would shy off for lack of self-efficacy.

The school budget guides principals to plan for ICT by considering TCO. In nearly all schools whether there were ICTs or not, a great number of principals budgeted for ICT which catered for outsourcing services. The high cost of ICT procurement was attributed to none budgeting for

ICTs however in the present study, principals' technology leadership was exhibited in ICT budget as willingness to enhance integration in management. There was a statistically significant relationship ($\chi^2=121.811$; $p=.010$) between budget for ICT and PTL in ICT use in management, with effect size (V) =0.057 as small. The PTL in DPs management had a positive relationship but document analysis data and partly observation revealed a glaring gap between ICT budget and the actual TCO for ICT. Through interview schedule it was observed that a lot was spent on consultation with experts and outsourcing services.

Data from document analysis revealed that most ICT technicians were certificate level holders and from interviews it was established that the highly qualified demanded for higher remuneration which principals were unwilling to commit to. For any complex work on ICTs, principals engaged hired personnel which rendered the services rather costly for the school higher. Documents analysis indicated there was an association between outsourcing ICT experts and frequent recurrence of troubleshooting ICT gadgets. Frequent hiring of experts in a nutshell was more costly than having a highly qualified technician in school. There was a statistically insignificant relationship ($\chi^2=76.991$; $p=.573$) between available qualified ICT technician and PTL for ICT integration in DP's office with the effect size (V)0.60 being large implying that although the relationship was insignificant but the effect size had an impact on PTL in ICT use.

Schools where experts were not consulted had either qualified ICT technicians who also doubled up as computer teachers or had no ICTs. On the other hand the high number of schools which consulted experts could mean they lack qualified technicians or had certificate holder technicians who could not handle mega issues. This study did not resonate with Shihundu and Luketero (2014) study where respondents (84.2%) rarely or never consulted experts outside school. There

was a statistically insignificant relationship ($\chi^2=54.745$; $p=.741$) between PTL in ICT use in DPs office and consulting experts where effect size (V) = 0.51 was large. This was interpreted to mean that some principals would still involve computer teachers or hired ICT or computer certificate holders where the outcome spilled over TCO budget and in the event, there would be continued spending on TCO. Observation checklist data revealed that schools had issues with e-waste management even with expert consultation where some ICTs could be put to use.

A written plan is an important document that guides PTL together with ICT committee/team to plan for ICT integration in management activities. If well penned down and followed to the letter, factors such as lack of trained personnel, poor budgeting, staff development policy and qualified technical support would not arise. (V) =0.77, the implication was that a written plan for ICT was a core basis for the commencement of the ICT integration process in the DPs' management activities. However, there was a statistically insignificant relationship between a written plan and PTL in use with ($\chi^2= 126.689$; $p=.705$) and effect size (V)=0.77 as large. This implied many principals believe that a written plan cannot play any significant role in ICT integration if the theory part was not implemented.

Staff development in ICT is central to integration as staff without previous training would have an opportunity to train and acquires skills. Data from interview schedule and document analysis indicated that principals initiated school programs to support staff professional development. Adu and Olatundun (2013) study agreed with this finding that such initiatives ensure teachers' skills and competencies are achieved for effective ICT integration. Lack of training is one of the greatest inhibitor to integration with regard to troubleshooting and the complexity of technologies since principals' as technology leaders are obligated to improve staff ICT skills.

Despite the large effect size ($V = 0.58$) indicating staff development in ICT enhances PTL in ICT integration, the findings contradicted the assertion. There was a statistically insignificant relationship between PTL in ICT use and support for ICT since ($\chi^2 = 72.236; p = .265$) at 5% confidence interval. This showed principals' willingness to support staff but document analysis data revealed that programs were in theory rather than practice.

4.8.2.3 Culture Changes

The DPs' responses on culture changes put in place to enhance ICT use are in Table 4.18. From Table 4.18, school vision for ICT ($p = .010$) and strategies for ICT development and training ($p = .000$) indicated that there was a statistically significant relationship between them and ICT use in management. On the other hand, the findings established that there was statistically insignificant relationship between innovativeness ($p = .324$), merging of ICT activities with school vision ($p = .990$), integration of ICT geared towards good management ($p = .158$) and teambuilding for ICT integration ($p = .051$) and ICT use in management activities in DP's office.

Table 4. 17: Deputy Principals' Responses on Culture Change

	AF	ANF	N.A			
Culture changes ($n=212$)	$f(\%)$	$f(\%)$	$f(\%)$	χ^2	p	V
School vision for ICT	152(71.7)	47(22.2)	13(6.1)	148.59	0.010	0.84
Innovativeness	35(16.5)	137(64.6)	40(18.9)	93.575	0.324	0.66
Merge of ICT activities with school vision	18(8.5)	72(34.0)	122(57.5)	5.566	0.990	0.02
ICT integration geared towards good mgt	53(25.0)	90(42.5)	69(32.5)	9.745	0.158	0.21
Strategies in ICT development and training	20(9.4)	99(46.7)	93(43.9)	54.745	0.000	0.51
Teambuilding for ICT integration	133(62.7)	70(33.0)	9(4.2)	108.80	0.051	0.72
Average Effect Size						0.49

Key: AF=Available and Functioning, ANF=Available but Not functioning, NA=Not Available

A school vision for ICT enables the principal plan or set targets towards ICT integration and then the effect is that schools with a vision for ICT worked towards set targets. This study

established that majority of schools had school vision for ICT meaning that principals were focused on digitalization of management tasks. There was a significant relationship between school vision for ICT and PTL in ICT integration in management activities, where ($\chi^2 = 148.594; p = .010$) and effect size ($V = 0.84$) was large. This implied that schools vision for ICT was positively correlated to the PTL in ICT use in DPs office.

Technology is said to be relatively young in management functions and on culture change regarding innovativeness, principals' endeavoured to find ways and means of getting funding towards ICT. The funds would include renovating structures for ICT operating rooms, used on ICT savvy staff to cascade knowledge and skills and involved stakeholders in forging the way forward for ICT integration. This study revealed that there was an insignificant relationship between innovativeness and PTL in ICT integration in management ($\chi^2 = 93.575; p = .324$) and the effect size ($V = 0.66$) was large. Innovativeness enhances integration in the office of DPs however from data from interview schedules indicated that principals could be innovative in ideas but lack administrative support in terms of funding, equipment donations and or personnel to assist in the program. A principal argued that in rural set up, parents or community would rather see a classroom or dormitory rather than ICT innovations.

Another part of culture change included merging of ICT activities with school vision where ICT activities not in tandem with the school vision hardly make meaningful direction among staff. A technology savvy leader shares the school vision with staff for inclusivity to adopt the idea of ICT integration. Staff linking out ICT activities to school vision is usually doable where staff were part of the action plans at one stage or another. The PTL engages staff through ICT consultants to mount workshops with an aim of linking ICT activities to school vision. Most principals were yet to actualize this change in their leadership practices. There was insignificant

relationship between merging of ICT activities with school vision and PTL in ICT integration in DPs management activities since critical value ($\chi^2=5.566$; $p=.990$) at 5% confidence interval. This was further evidenced by a small effect size (V) = 0.02, which indicate a weak relationship between merging of ICT activities with school vision and the PTL in ICT integration in DPs' office. It has to be noted that merging school vision with ICT activities should purpose to enhance service delivery, however in most schools this was not the case.

There was a statistically insignificant relationship between ICT integration geared towards good management and PTL in ICT integration in DPs office where ($\chi^2=9.745$; $p=9.745$) and a medium effect size (V) = 0.21 being medium. This implied that ICT integration geared towards good management on average enhances technology leadership in ICT use in management activities in the office of the DPs

Strategies for ICT development in schools vary from school to school depending on the priorities. Some strategies might include promotion of staff based on set targets for due date, providing incentives for effective integration, provide basic infrastructure for ICT integration and provide opportunities for capacity building. Incentives with intrinsic or extrinsic attachment are purposed to stimulate desire and energize staff to work towards achieving intended change. This change was lacking to bring about strategized formular for ICT development. Strategies are very important skills for managers in making things move even with constraints. There was a statistically strong significant relationship between putting strategies for ICT development and training in schools and PTL in ICT use in management activities ($\chi^2= 54.745$; $p=.000$) and the effect size (V) = 0.51 as large. The means that PTL that embraced strategies to develop ICT and training in schools enhanced changes to integration and vice versa.

Teambuilding role of teams is to bring cooperate responsibility among members to bring each and everybody on board for a common purpose. Team building requires technology leadership best practices in understanding staff belief syetems towards ICT integration. Technology leadership knowledgeable enough to explore change theories enables staff to gain in depth understanding of leadership skills. By implication PTL fell short of knowledge on change theories that enable them build teams for ICT enhancement. This study established that there was a statistically insignificant relationship between teambuilding for ICT integration and PTL in ICT integration in management where ($\chi^2=108.802; p=.051$). However, there was a large effect size ($V= 0.72$). The implication is that teambuilding as a culture to enhance ICT integration improved PTL in ICT integration. However, there was a weak relationship in that perhaps teambuilding for this purpose was not in practice.

4.8.3 Director of Studies Responses on Principals' Technology Leadership in ICT Integration

To determine PTL in ICT integration in DOS office with regard to infrastructural, organizational and policy and culture changes, their responses were as shown in Table 4.19 - 4.21

4.8.3.1 Infrastructural Changes

Table 4.19 presents results from DOS responses on PTL in ICT use. Findings indicated that there was a statistically significant relationship between PTL in electricity ($p=.004$), operating room ($p=.000$), modem ($p=.004$), email ($p=.002$), computers and laptops($p=.009$), flashdisk ($p=.000$) and Internet connectivity($p=.042$) and ICT use. Nonetheless, there was statistically insignificant relationship between PTL and website ($p=.805$), printer ($p=.310$), scanner ($p=.263$), photocopier ($p=.919$), surveillance camera ($p=.712$) and management software ($p=.348$)and office of DOS.

Table 4. 18: Director of Studies Responses on Infrastructural Changes

Infrastructural changes	AF <i>f</i> (%)	ANF <i>f</i> (%)	NA <i>f</i> (%)	χ^2	p	V
Electricity	75(70.8)	6(5.7)	25(23.6)	71.906	.004	0.82
Operating room	71(67.0)	7(6.6)	28(26.4)	60.245	.000	0.75
Cellphones	106(100)	-	-	-	-	-
Modem	35(33.0)	19(17.9)	52(49.1)	15.415	.004	0.38
Email	95(89.6)	3(2.8)	8(7.5)	97.491	.002	1.20
Website	27(25.5)	10(9.4)	69(65.1)	52.208	.805	0.70
Computers and Laptops	73(68.9)	14(13.2)	19(17.9)	60.585	.009	0.76
Flash disk	65(61.3)	28(26.4)	13(12.3)	40.547	.000	0.62
printer	40(37.7)	28(26.4)	38(35.8)	2.340	.310	0.15
Scanner	31(29.2)	10(9.4)	65(61.3)	43.60	.263	0.64
Photocopier	43(40.6)	7(6.6)	56(52.8)	36.472	.919	0.59
Surveillance cameras	2(1.9)	1(0.9)	103(97.2)	151.264	.712	1.19
Internet connectivity	36(34.0)	9(8.5)	61(57.5)	38.283	.042	0.60
Management software	30(28.3)	42(39.6)	34(32.1)	2.113	.348	0.14
Average Effect Size						0.66

Key: AF=Available and Functioning, ANF=Available but Not functioning, NA=Not Available

According to DOS responses, electricity being a prerequisite for ICT integration, most principals ensured their schools had electricity for various uses. The study concurs with Mbugua, Gori and Tanui (2015) finding that 67.7% of schools had electricity as opposed to 32.3% yet to install. The study recommended that MOE should prioritize school electrification programs so that each and every school is connected. There was a statistically significant relationship between availability of electricity and PTL in ICT use in DOS office in ($\chi^2=71.906$; $p=.004$) and effect size (V) =0.082 was large. This implies that principals' leadership on infrastructural changes like electricity was commendable as a major pre-requisite for ICT integration functionality.

Observation checklist revealed that most of the ICT operating rooms were computer labs which were for curriculum and not necessarily for DOS management activities. However through principals' technology leadership, computer rooms and the computers therein were used by staff. Other rooms included the DOS office where all teachers alternately used ICTs for purposes of

management functions. Adebi-Caesar, Offei and Dontwi (2012) study resonates well with the current study as the issue of operating room applies to computer room as indicated by 138(98.6%) while only 2 (1.4%) cited their offices. There was however a statistically significant strong relationship between the PTL and ICT operating rooms for integration where ($\chi^2=60.245$; $p=.000$) and effect size (V) =0.75 was large. Availability of operating rooms alone was not sufficient enough to propel ICT integration in management yet quite an asset to look upto. Damkor, Irinyang and Haruna (2015) argue that despite efforts from most stakeholders to equip schools with ICTs, majority of schools in developing Nigeria, do not have computers. Through interview schedules and observation checklist, it was observed that some schools had ICTs but due to shortage in operating room, ICTs were stored somewhere.

Although DOS indicated that all schools 106(100%) had available and functional school cellphones, which belonged to either principals or school, they could not authoritatively ascertain the information as this was purely classified. From interview schedule with principals, it was observed that what was referred to as school cellphones were actually principals' personal gadgets and document analysis did not present any information on school cellphones either. It is important that principals procure cellphones for schools where secretaries could be assigned to operate on behalf of the school unless the issue concerns a particular individual staff member or department. In this case, chi-square statistics was not generated as the entries were constant.

Schools used modems but due to poor network connectivity from service providers, old fashioned modems like Orange and the ever costly Safaricom were available. This study established that majority of schools did not have modems 52(49.1%). Management activities that required the Internet would expect staff to outsource services in cyber café or use modems where the latter were a better substitute in the absence of Internet connectivity in schools. There was a

statistically significant relationship ($\chi^2=15.415$; $p=.004$) between a modem and PTL in ICT integration in DOS office management activities where the effect size (V) =0.38 was large. Modems were significant in integration in DOS office where Internet connectivity was lacking or simply unsustainable. Based on the work performed by the DOS, modems are very important gadgets in management functions.

Email as a mode of communication has since the recent past been central in management system operations in institutions hence why all schools are required to have an email address. Earlier interview with principals revealed that given the government guidelines and directives that communication is online, schools were obligated to have email address except in rare circumstances where principals' emails were in use. Interestingly, Abdelwahed (2016) study in Sudan revealed that 87.5% of teachers in PSS lack skills to use emails. It was not clear though whether schools had email address accessible to all teachers. Availability and functionality of school email doesn't just seem to be enough but as Abdelwahed (ibid) indicated, users need knowledge and skills. There was a statistically significant relationship ($\chi^2=97.491$; $p=.002$) between emails and PTL in ICT use in DOS office and the effect size (V) =0.96 was large. This implied that emails play a central role in communication as a school management activity.

The website is another form of communication that links the school with people locally and globally with the aim being to promote/market school activities variously. The DOS indicated that 27 (25.5%) had functional websites, 10 (9.4%) had but dormant while a great number of schools 69 (65.1%) had no website. This implied that despite the popularity websites are gaining in institutions, the phenomenon was inadequately explored. Principals' interview schedules earlier on revealed that cost implications on establishment and maintenance were a hindrance in

some young schools an assertion that was supported with BOM meeting minutes in some schools. Although some schools had websites but non functional. Such ideas raise questions on the objective behind developing a website that would be dormant. There was a statistically insignificant relationship between a school website and PTL in ICT use in management activities ($\chi^2=0.805$; $p=.805$) between school website and PTL in ICT use in DOS management activities and the effect size (V) =0.70 was large. Although the relationship was insignificant the effect size had a bearing on DOS office, the website was therefore important for principals.

Principals are today burning midnight oil to ensure school had one or more computer(s) for administrative function because of its advantages of making work easy. Computers are the main ICTs that others would depend on for functionality however in most schools accessibility would be more important to staff users than just having them. There was a statistically significant relationship ($\chi^2=60.585$; $p=.009$) between computer or laptop and PTL in ICT integration and effect size ($V= 0.76$) was large enough to affect ICT use in DOS office.

According to the DOS, 65(61.3%) schools that had functional flash disks, 28 (26.4%) available but not working while 13 (12.3%) did not have any. The DOS office by its nature of work comes across as the busiest office in most if not all secondary schools and personal flash disks were used. However majority of DOS office had functional flash disks with or without adequate computers because of its advantage storage and portability. There was a statistically strong significant relationship ($\chi^2=40.547$; $p=.000$) between the flash disk and PTL in ICT integration in the office of the DOS where the effect size (V)= 0.62) was large to affect use. According to Cohen, (1988), it signifies high strength of relationship that existed between flash disks and the PTL. In spite of the significant relationship that a flash disk had on integration in DOS office, the

high effect size data from interviews were incognizant of other factors like lack of computers or laptops, electricity and printer that interfered with school timetable, confidentiality of school documents whenever processing of material was outsourced and cost implications involved.

A printer that was in a working condition and available was in 40 (37.7%), and 28(26.4%) had yes but was non functional while 38 (35.8%) were short of any. Printer(s)in school makes work cost effective compared to commercial services however it is understandably clear that printer only works where there is a computer/ laptop. Such schools would incur extra costs of printing in commercial centers which also weakened the school's ability to keep information confidential. This study revealed that the relationship between PTL and a printer for use in DOS office was statistically insignificant($\chi^2 = 2.340$; $p=.310$) and small effect size (V)= 0.15.This was interpreted to mean with or without a printer in DOS office, printing services would still be done through cyber café, borrowing from friendly institutions or individual staff members.

Data shows availability of a functional scanner was in 31 (29.2%) schools, available but obsolete was in 10(9.4%) and a majority 65(61.3%) did not have. According to DOS, only few schools had scanners and services that required a scanner were outsourced in cyber cafes. The study concurs with Wanjala, Adhiambo and Ngumbi (2013) study that only 18.6% schools had scanners while a whole 91.4% had no scanners. This implied that many principals relied on outsourcing services rather than having the school owning some equipment for varied reasons. Observations and document analysis revealed that there was only one or two scanner(s) in every school which was only integrated alternately in DOS and principal's office. Principals during interviews argued that since it was not an ICT regularly used, it would be uneconomical to have it for all users. There was a negative relationship ($\chi^2=43.60$; $p=.263$) between a scanner and

principals technology leadership in integration in the DOS office in management processes where the effect size (V) =0.64 was large. Scanning services in PSS could be described as uncommon hence the ability to seek such services only and when necessary.

Functional and available photocopier was found in 43 (40.6%), available but not in a working condition 7(6.6%) while in whole 56 (52.8%) had no photocopiers. More than half of the study schools lack photocopier machines making work rather costly given that printing is even more expensive. Just as printers, a photocopier would be fairly cost effective. From observation, most schools had no photocopiers which were attributed to high costs in TCO. Many schools had 1-2 photocopiers stationed in either the principal's office and or DOS office as selected pools. There was a negative relationship ($\chi^2=36.472$; $p=.919$) between a photocopier and PTL for integration in the DOS office and the effect size (V)=0.59 being large. Although photocopier had insignificant relationship as in the effect size, responses might have been guided by inadequacy/lack of equipment or availability of outsourcing services. This means that despite the insignificant relationship, photocopiers were valuable components in management. Principals argued that a photocopier was preferred to a printer if cost implications were anything to go by. From observation checklist, schools had more functional and dysfunctional photocopiers than printers indicating preference.

The latest ICT equipment in schools being the surveillance camera was not available in most sample schools. Data from DOS revealed that surveillance cameras were available in 2(0.9%), available but not working in 1(0.5%) while a whole 103 (97.2%) had no surveillance cameras. Implementation of this infrastructural change was minimal due to associated high costs otherwise school technology leadership was cognizant of its importance. During interviews, principals

observed that gadgets were handy on security matters but decried the high costs associated with them which would hurt on schools financial systems. However, even with economically stable schools of Extra County and national levels, surveillance cameras were not yet in place. Observations revealed that nearly all schools lacked surveillance camera implying majority were old school in terms of security management. There was insignificant relationship between PTL and surveillance camera for integration in DOS office ($\chi^2=65.264$; $p=.712$) but the effect size was (V)=0.78 was large.

According to DOS responses, Internet connectivity was available and working in 36 (34.0%) schools, 9 (8.5%) had but dysfunctional while more than average 61 (57.5%) did not have. Many of the schools with Internet connectivity benefitted from ESP as observed by a majority of principals but argued that although the Internet was valuable, the problem lies in the power outages and poor services provider. Schools that benefitted from ESP then were unable to sustain. The high cost of Internet connectivity and maintenance affected most schools hence their preference of cyber services. Although the Internet serves several benefits to the school, Musambai, Ndirangu and Mukhwana (2017) in their critical opinion observed that in only 49% of principals agreed that the limited access to Internet was a challenge while Kimuyu, Kalai and Okoth indicated that lack of Internet affected use of email for communication. The current established that there was a statistically significant relationship($\chi^2=38.283$; $p=.042$) between Internet connectivity and PTL in ICT use in DOS office and effect size (V)=0.60 was large.

The study established that 30 (28.3%) had functional management software,42(39.6%) was not functional while 34(32.1%) was not available. Data from interviews and document analysis revealed some computers were outdated and current management software was incompatible

hence the comparatively high percentage of available and not functional software indicated. Some principals went a notch higher to purchase management software but documents revealed that most of them were dysfunctional despite high financial investment. This study corroborated with Manduku, Kosgey and Sang (2012) findings that majority (71.4%) of public secondary schools lack software. There was a statistically insignificant relationship between management software and PTL ($\chi^2=2.113$; $p=.348$) and effect size (V) =0.14 was small.

4.8.3.2 Organizational and Policy Changes

Table 4.20 portrays DOS results on organizational and policy changes indicating that there was a statistically significant relationship between ICT committee ($p=.000$), consulting experts ($p=.001$) and staff development in ICT programs ($p=.000$) and PTL in ICT use. The study also established that there was a statistically insignificant relationship between ICT code of conduct ($p=.562$), school ICT policy ($p=.337$), budget for ICT ($p=.190$), qualified ICT technician ($p=.823$) and written plan for ICT and PTL in ICT use.

Table 4. 19: Director of Studies Responses on Organizational and Policy Changes

	AF	ANF	NA	χ^2	P	V
Organizational & Policy Changes (n=106)	<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)			
ICT code of conduct	2(1.9)	11(10.4)	93(87.7)	92.321	0.562	0.93
ICT committee	5(4.7)	18(17.0)	83(78.3)	98.849	0.000	0.97
School ICT policy	35(33.0)	16(15.1)	55(51.9)	21.528	0.337	0.45
Budget for ICT	89(84.0)	10(9.4)	7(6.6)	89.396	0.190	0.92
Qualified ICT technicians	28(26.4)	0(0.0)	78(73.6)	77.509	0.823	0.86
Consult ICT experts	69(65.1)	0(0.0)	37(34.9)	13.717	0.001	0.36
Written plan for ICT	4(3.8)	20(18.9)	82(77.4)	96.075	0.793	0.95
Staff development in ICT	74(69.8)	23(21.7)	9(8.5)	66.245	0.000	0.79
Average Effect Size						0.78

Key: AF=Available and Functioning, ANF=Available but Not functioning, NA=Not Available

The school ICT code of conduct provides guidelines to regulate ICT usage. Since majority of schools were without ICT code of conduct, ICTs could easily break down under the hands of users without being identified for accountability. This study was inconsistent with Kiptalam and Rodrigues (2010) study which established that 64% of schools had ICT code of conduct. This portrays the understanding of a working ICT code of conduct in school management. The study indicated that there was a statistically insignificant relationship ($\chi^2=142.321$; $p=.562$) between ICT code of conduct and PTL in ICT use in DOS office and effect size (V)=0.93 being large. This meant that integration of ICT in DOS office would still be successful without ICT code of conduct. In spite of the significant relationship, the role of an ICT code of conduct partly explains why there were so many ICT breakages in schools. From the interview schedule and document analysis it was established that teachers were free to access ICTs for professional work with no specific code of conduct to adhere to.

According to the DOS responses, the functional ICT committee was only in 5(4.7%) schools, 18 (17.0%) was available but dysfunctional while 83 (78.3%) did not have. The ICT committee is the technology leader's eye as it recommends issues to do with ICT including purchase and replacement, staff development needs among others. The absence of an ICT committee is likely to affect principals' coordination of subsystems in integrating ICTs hence fail technology leadership for ICT integration. Principals apparently did not understand the value and importance of an ICT committee in a school where ICT was taking shape. There was a statistically significant relationship between ICT committee and PTL in ICT use in management activities in DOS office ($\chi^2=98.849$; $p=.000$) and the effect size (V)=0.97 was large. Despite the large effect size, ICT committee is an important aspect of PTL on organizational and policy changes to

observe. The ICT committees work together with DOS to identify areas of need on ICT integration, assist in budgeting for TCO and advice management accordingly.

The introduction of ICTs in schools requires users' to be proficient, knowledgeable and well skilled to integrate ICTs however most teachers are neither. This then requires principals in exercising technology leadership together with ICT committee (if any) to develop a school ICT policy that focuses on ICT savvy teachers. According to DOS, the school ICT policy was available and working in 35(33.0%) schools, 16 (15.1%) it existed in theory rather than practice while 55 (51.9%) had none. Unlike this study, Nangue, Creunen and Church (2011) study contend that no school had school ICT policy in Cameroon case study schools. This study revealed that there was a statistically insignificant relationship between school ICT policy and PTL in ICT use in DOS office ($\chi^2=21.528$; $p=.337$) and effect size (V)=0.45 was large. This was associated with PTL to translate school ICT policy into practice which was hardly the case. This implied that when staff development policy is put into practice, its impact on PTL in ICT use in management could be enormous.

According to the DOS, the budget for ICT was overwhelmingly available and working in 89(84.0%) schools, 10(9.4%) available but dormant while a paltry 7(6.6%) had none. Implementation of ICT is costly if considerations for TCO are anything to go by however most schools had ICT budgets regardless of the economic status and other demanding necessities. In spite of available budgets, observations revealed that some schools had ICTs such as computers, printers and or photocopy machines dumped somewhere for lack of maintenance. Laaria (2013) and Manduku, Kosgey and Sang (2012) studies were in agreement with this study finding that ICT implementation in schools faced financial constraints. It is interesting to note that part of the

budget read maintenance which was in reality not catered for. There was a statistically significant relationship between ICT budget and PTL in ICT use in DOS office management ($\chi^2=89.396$; $p=.190$) and the effect size (V) =0.92 was very large to affect ICT use. The implication is that budgeting for ICT by various schools is a big step towards ICT use in the management if and when there is a link between budget in theory and budget in practice.

In this study, 16(15.1%) schools had qualified personnel, 28 (26.4%) had but were converted to perform other duties while 78 (73.6%) did not have. The complexity involved in using ICTs would fundamentally require qualified personnel to support users. Having an ICT technician in school helps build users' confidence in accessing ICT without fear of troubleshooting problems while on the contrary, lack of such could be reason for resistance to ICT integration. This study resonated with Oloo (2009) study which revealed that 71.9% of schools did not have an employed technician compared to 28.57% that had. From documents analysis, it was clear that most technical support were teachers with certificate level in computer who doubled up. During interviews principals observed that hiring of highly qualified ICT technician was costly as such employees demand for higher remunerations which some schools could not afford. There was a statistically insignificant relationship between ICT technician and PTL in ICT use in DOS office($\chi^2= 77.509$; $p=.823$)and effect size (V) =0.86 was very large. Although the effect size was high, the DOS office in most cases comprise of ICT savvy staff who more often than not doubled up as ICT technicians and occasionally outsourced services was the alternative. This explains why ICT technician in the DOS office was not an issue as such however, it was ideal to hire qualified technician.

Data from DOS revealed that schools that consulted ICT experts were majority 69 (65.1%) while a few 37 (34.9%) did not. This study finding revealed that most schools without ICT technician relied on consulting experts whenever there was need. By hiring an ICT expert, a technology leader ensures a well articulated vision and plan to provide guidance on effective and efficient ICT integration. Contrary, most principals hired services of experts just for that day and issue but not necessarily articulating vision and plan per se. There was a statistically significant relationship between consulting ICT experts and principals' technology leadership for ICT integration in the office of DOS in management functions where ($\chi^2 = 13.717$; $p = .001$) and the effect size ($V = 0.36$) was large. The significance defined the importance of consulting ICT experts on ICT to maintenance and sustainability. Data from interview schedule pointed out how regular experts were consulted but the less qualified in most cases which according to document analysis, it was more expensive than hiring a qualified technician.

A functional written plan for ICT was only available in 4 (3.8%) schools, 20 (18.9%) had but just on paper while an impressive 82 (77.4%) had none. Planning for ICT integration opens up the intention to be put in practice rather than when it's just word of mouth. Data from document analysis indicated that schools with written ICT plans were subsections within school strategic plans and not as independent documents per se. By implication principals did not seem to pay much attention to written ICT plans despite its value in integration. This study established that there was a statistically significant relationship between a PTL and ICT written plan in ICT use in DOS office management activities where ($\chi^2 = 96.075$; $p = .793$) and the effect size ($V = 0.95$) was very large, meaning an ICT written plan is central to integration. However, most schools failed to prepare ICT written plans but were included in school strategic plan as an item, which implied lack of technology leadership on the same.

This study found that 74(69.8%) principals had a policy that supported staff to be ICT savvy, 23 (21.7%) had but not functional while 9(8.5%) failed to put such in place. Technology leadership has a duty to support staff for ICT integration by putting emphasis on acquisition of knowledge and skills in ICT. This should manifest in technology leadership working to support staff in achieving set school vision although type of support provided might vary from school to school depending on priorities. According to document analysis and interview data, beneficiaries of support staff policy on ICT were mostly mathematics teachers and science teachers under the SMASSE through CEMASTEWA workshops. There was statistically very strong significant relationship between support staff for ICT and PTL($\chi^2=66.245$; $p=.000$) and effect size ($V=0.79$) was large implying support for staff is paramount for successful ICT use.

This study established that 72 (67.9%) DOS indicated that there was staff support program to improve ICT skills, 30 (28.3%) had a non functional one while 4 (3.8%) did not have. The newness of ICT integration in school management subsystems demands of technology leadership to develop ICT skills among staff members to ensure effectiveness in equipment use. This study provides professional staff development as a way to improve on knowledge and skills through training since in some instances, teachers expressed fear for lack of knowledge and skill for integration. For this reason, there is need for staff support programs to improve on skills at whatever level. There was a statistically negative relationship between staff support to improve ICT skills and PTL in ICT use in DOS ($\chi^2 = 66.642$; $p=.734$) and effect size ($V = 0.79$) which was large enough to affect integration.

4.8.3.3 Culture Changes

Table 4.21 indicated that there was a statistically significant relationship between school vision for ICT ($p=.037$), ICT integration geared towards good mgt ($p=.005$), strategies ICT

development and training ($p=.012$) and teambuilding for ICT integration ($p=.000$) and PTL in ICT use. On the contrary, there was a statistically insignificant relationship between innovativeness($p=.241$) and merging of ICT activities with school vision ($p=.791$) and PTL in ICT use.

Table 4. 20: Culture Changes

Culture changes (n=106)	Af	ANF	N.A	χ^2	p	V
	f(%)	f(%)	f(%)			
School vision for ICT	80(75.5)	20(18.9)	6(5.7)	87.472	.037	0.91
Innovativeness	84(79.3)	-	22(20.8)	69.189	.241	0.81
Merge of ICT activities with school vision	3(2.8)	25(23.6)	78(73.6)	84.132	.791	0.89
ICT integration geared towards good mgt	23(21.7)	33(31.1)	50(47.2)	10.547	.005	0.32
Strategies ICT development and training	21(19.8)	44(41.5)	41(38.7)	8.849	.012	0.29
Teambuilding for ICT integration	50(47.2)	48(45.3)	8(7.5)	31.774	.000	0.55
Average Effect Size						0.63

Key: AF=Available and Functioning, ANF=Available but Not functioning, NA=Not Available

Data from Table 4.21 indicated that 80 (75.5%) schools had a school vision for ICT, 20 (18.9%) had a dysfunctional one and 6 (5.7%) did not have. A technology leader works out on school culture changes to initiate a clear vision on ICT focus for management. Planning of school vision for ICT calls for the expert's input to enhance efficiency and focus since the school principal is not always an expert in the area. There was a statistically significant relationship between a school vision and the PTL in ICT use in DOS office ($\chi^2=87.472$; $p=.037$) and the effect size (V) =0.91 was large enough to demonstrate how strong school vision was.

According to DOS, 84 (79.3%) the PTL changed the school culture by being innovative while 22 (20.8%) were not innovative. The kind of innovations observed in most schools centered on computer study programs where classrooms were transformed into computer labs and one or two

computers put into administrative use. Others included use of flash disk to store information that was printed or downloaded elsewhere and staff accessing ICTs in DOS office. Principal's role in innovation brings forth dynamic look that transforms infrastructure, attitudes and management practices in sub systems hence the need to prepare staff for changes to come. There was a statistically insignificant relationship between innovativeness as a form of culture change and the PTL in ICT use in management activities ($\chi^2=69.189$; $p=.241$) and effect size (V) =0.81 was large signifying the strength of association to affect integration.

The merging of ICT activities with school vision was available and working in only 3(2.8%), 25 (23.6%) was more on paper than practice while 78 (73.6%) was not available. The purpose of having an ICT school vision is to provide ground to integrate ICT in school activities to make work easier for management while ICT integration in management is to improve service delivery. For instance in some schools the vision was to improve access and use of ICT among staff but that was not in practice. This study revealed that there was statistically insignificant relationship between merging ICT activities with school vision and PTL in ICT use in management ($\chi^2=84.132$; $p=.791$). However, effect size associated with the findings indicated that there was strong strength (V) = 0.89 large effect size. Data from document analysis revealed that most principals did actualize this commitment by struggling to beat deadlines whenever they were called upon with or without ICTs in school.

Data shows that the culture change to ensure that ICT integration was geared towards good management was evident and working in 23 (21.7%) schools, 33 (31.1%) available but not working while in 50 (47.2%) had no such an idea. A new practice, strategies are required to ensure users are at ease with ICT integration. The importance of strategies to instill knowledge

and skills in human resource could be done through trainings to increase performance and output. Technology leadership through funding ICT training programs motivates teachers to integrate ICT as a way of alleviating their fears in its use. However, there was a statistically significant relationship between ICT integration geared towards management and principals technology leadership for ICT integration in management where ($\chi^2=10.547$; $p=.005$) and the effect size (V) =0.32 was medium. This implies that on average, when there is ICT there is improved service delivery in terms of management.

As a new practice strategies should be put in place to ensure that users were at ease with ICT integration. There were 21 (19.8%) DOS who affirmed availability and functional strategic ICT development and training programs, 44 (41.5%) indicated that they were available yes but dormant while 41 (38.7%) did not have any. The importance of strategies to instill knowledge and skills in human resource could be done through trainings to increase performance and output. Technology leadership through funding ICT training programs motivates teachers to integrate ICT as a way of alleviating their fears in use of ICT. There was a statistically significant relationship between strategic ICT development and training and PTL in ICT use in management ($\chi^2 = 8.849$; $p=.012$) and medium effect size (V) = 0.29.

As a new practice strategies should be put in place to ensure that users were at ease with ICT integration. There were 21 (19.8%) DOS who affirmed availability and functional strategic ICT development and training programs, 44 (41.5%) available but dormant while 41 (38.7%) did not have any. The importance of strategies to instill knowledge and skills in human resource could be done through trainings to increase performance and output. Technology leadership through funding ICT training programs motivates teachers to integrate ICT as a way of alleviating their

fears in use of ICT. The study indicated that ICT was not planned as a strategy *per se* due to shortage but captured in the school strategic plan which was supported by data through document analysis. There was a statistically significant relationship between strategic ICT development and training and PTL in ICT use ($\chi^2 = 8.849$; $p=.012$) and medium effect size ($V = 0.29$).

Teambuilding for ICT integration was indicated by 50 (47.2%) DOS as available and working, 48(45.3%) indicated that such was merely in theory rather than practice while 8 (7.5%) did not embrace teams for purposes of ICT. Technology comes with complexities likely to instill fears on users' knowledge and skills and typical resistance to change however data from interviews indicated that teams existed only that they were not formal but played a significant role on hands-on type of training. The study was inconsistent with Tondeur *et al* (2009) finding that change is resistible and is incumbent upon technology leadership to encourage teambuilding through motivation and enhanced participatory planning. It's upon technology leadership to build teams to enhance on-the-job-training. There was a statistically significant relationship between teambuilding and PTL in ICT use ($\chi^2=31.774$; $p=.000$) and effect size ($V =0.55$) was large.

4.8.4 Class Teachers' Responses on Principals' Technology Leadership in ICT Integration

Class teachers' responses on PTL in ICT use in class management were as in Tables 4.22 - 4.24. Other details of the results refer to Table 4.22.

4.8.4.1 Infrastructural Changes

Table 4.22 depicts that there was a statistically significant relationship between electricity ($p=.000$), operating room ($p=.001$), cellphones ($p=.002$), modem ($p=.041$), email ($p=.022$), website ($p=.000$), computers or laptops ($p=.000$), flashdisk($p=.000$), printer ($p=.001$), scanner

($p=.008$), surveillance camera ($p=.001$), Internet connectivity ($p=.000$) and PTL in ICT use in class management.

Table 4. 21: Infrastructural Changes

Infrastructural changes (n=270)	AF <i>f</i> (%)	ANF <i>f</i> (%)	N.A <i>f</i> (%)	χ^2	p	V
Electricity	138(51.1)	63(23.3)	69(25.6)	38.60	.000	0.38
Operating room	54(20.0)	0(0.0)	219(81.1)	156.8	.001	0.76
Cellphones	51(18.9)	173(64.1)	219(17.0)	114.956	.002	0.65
Modem	47(17.4)	171(63.3)	52(19.3)	109.489	.041	0.64
Email	176(65.2)	78(28.9)	16(5.9)	144.622	.022	0.73
Website	31(11.5)	110(40.7)	129(47.8)	60.022	.000	0.47
Computers or Laptops	138(51.1)	104(38.5)	28(10.4)	70.489	.000	0.51
Flash disk	50(18.5)	177(65.6)	43(15.9)	126.422	.000	0.68
printer	32(11.9)	141(52.2)	97(35.9)	66.822	.001	0.50
Scanner	33(12.2)	141(52.2)	96(35.6)	65.40	.008	0.49
Photocopier	37(13.7)	141(52.2)	92(34.1)	60.156	.102	0.47
Surveillance cameras	3(1.1)	6(2.2)	261(96.7)	251.822	.001	0.97
Internet connectivity	44(16.3)	181(67.0)	45(16.7)	138.022	.000	0.71
Management software	25(9.3)	193(71.3)	52(19.3)	180.867	.049	0.82
Average Effect Size						0.63

Key: AF=Available and Functioning, ANF=Available but Not functioning, NA=Not Available

Table 4.22 shows that to 138(51.1%) CTs, there was functional electricity in their schools, 63(23.3%) had installed but was not working for one reason or the other while 69(25.6%) had no electricity at all. Installation of electricity is one of the major projects for principals where various ways and means are employed. Data from document analysis indicate that majority of schools with functional electricity were facilitated by KREP, CDF and or PTA projects. While this was commendable, it must be recognized that availability of electricity alone does not translate into ICT use. Quest, Kandjeo and Mushaadja (2014) had divergent findings where they posit that most schools in Namibia had challenges like lack of electricity in implementing ICT in secondary schools. However, public secondary schools in this study put in a greater effort to install electricity as an infrastructural change towards ICT integration. There was a statistically

significant relationship between electricity and PTL in ICT integration in class management activities where ($\chi^2=38.60$; $p=.000$) and the effect size (V)=0.38 was large. This means although electricity was significant but it does affect integration since from interviews, observation and document analysis it was established that CTs accessed ICTs out of their classes and that no school used alternative source of power supply like generator or solar.

Operating room for ICT integration was only available and working in 54(20.0%) schools, a whole 186(68.9%) had no functional rooms while 30(11.1%) did not have such rooms. Operating room for class teachers to integrate ICT in class management was one of the great challenges experienced. Through observations, it was established that some schools due to shortage of rooms, were non operational. Some schools had no staff room or if any, it was congested hence lack of space to install computers or any other ICT that required room. Principals' technology leadership was not up to standard although through observation some schools were actually still struggling to meet other demanding needs. Documents analysis revealed that some schools which benefitted from ESP and CDF had more than 20 computers and lack of room rendered the computers useless. There was a statistically significant relationship between an operating room and PTL in ICT use in class management where ($\chi^2=156.8$; $p=.001$). Operating rooms were found to be strongly associated with ICT integration as evidenced by the large effect size (V) = 0.76. The implication is without operating rooms it could be rather cumbersome for CTs to integrate ICT.

The cellphone is one of the fairly most recent forms of communication but according to CTs responses, 51(18.9%) schools had cellphones and 219(81.1%) did not have. Document analysis revealed that most schools used principals' cellphones for school matters and in isolated cases

for DPs or secretary. It was on this premise that majority of respondents cited not available. The idea of a phone that belongs to a principal or school property might not be easily known to class teachers whose work is to teach and perform any other duties assigned to them. There was a statistically significant relationship between cellphone and PTL in ICT use in class management ($\chi^2 = 114.956$; $p = .002$) at 5% confidence interval with the effect size ($V = 0.65$) being large which could easily affect integration.

The modem as an ICT in working condition was indicated by 47(17.4%) CTs, majority 171(63.3%) indicated availability but dysfunctional and 52(19.3%) did not have any. Most modems fail to work because of poor service provider network which perhaps explains the bigger number that was not functional. From document analysis some schools had the old model of both safaricom and orange modems which are currently off market. On the other hand it was not wholesomely possible for class teachers to tell whether the modem belonged to the school or personal. This study established that there was considerably high relationship between a modem and PTL in ICT use in class management where ($\chi^2 = 109.489$; $p = .041$) and effect size ($V = 0.64$) which was large. Modems were not only considered as significant but rather strongly perceived to facilitate communication and browsing.

With the recent form of communication in most offices being email, this study revealed that most schools 176(65.2%) had active emails, 78(28.9%) had but were dormant and a paltry 16(5.9%) did not have. However the disadvantage of locking out illiterates who by default might be among school stakeholders such as parents and guardians was common place. There was a statistically significant relationship between school email address and PTL in ICT use in class management

($\chi^2=144.622$; $p=.022$) and effect size (V) =0.73 was large. However from interviews and document analysis data, CTs hardly operated email on behalf of the school.

The study revealed that according to CTs, only 31(11.5%) had working websites, 110(40.7%) had dormant ones and most 129(47.8%) did not have. Websites advertise/ market the school variously but mostly by posting school results, providing location and school successes among other purposes. Principals seemed to be showing interest in designing websites but whatever holds them back to actively use them is a question perhaps for another day. Knowing the purpose of a website and what should be posted on it falls in PTL to have subject matter knowledge of it. There was a statistically strong significant relationship between website and PTL in ICT use($\chi^2=60.022$; $p=.000$) and effect size (V)=0.47 as large. Although only few schools had websites, websites are important its use takes root into management.

From Table 4.18,138(51.1%)CTs indicated availability of functional computers/laptops, 104(38.5%) available and not functional while 28(10.4%) did not have. infrastructural changes in form of computers and laptops were very well responded to but the need to hire ICT technician, consult an expert or put up operating rooms failed hence the non functional equipment. Data from document analysis revealed that broken down computers were from one company that supplied to schools and others through donations. They were rendered obsolete as they were old stuff not compatible with current ICT software which concurs with Wanjala, Adhiambo and Ngumbi (2013) that 132(94.3%) schools had functional computers while only 8(5.7%) did not have. The PTL demonstrated commitment to integrate ICT by providing computers in class management and other school functions. There was a statistically strong significant relationship

between computers and laptops and PTL in ICT use ($\chi^2 = 70.489$; $p = .000$) and the effect size ($V = 0.51$), being large shows strong relationship.

Flash disks were available and in working condition as indicated by 50(18.5%) CTs, available and not working 177(65.6%) and 43(15.9%) did not have. Flash disks are important portable storage devices commonly used in schools and safe for storing confidential data. The huge number of unused flash disks could be associated with lack of ICT code of conduct where staff would just use anything on computers leaving them with viruses. There was a statistically significant relationship between a flash disk and PTL in ICT use in class management functions as evidenced in ($\chi^2 = 126.422$; $p = .000$) and the effect size ($V = 0.68$) was large. From the interviews most CTs did not really need flash disks in class management activities since their work was stored on school computers.

According to the data, 32(11.9%) of schools had working printers, 141(52.2%) had but not working while 97(35.9%) did not have. A school printer saves on costs than when done commercially from a cyber. The high number of non functional printers did not really explain whether they were broken down or newly procured second hand type. Data from document analysis established that majority were broken down awaiting repair or to be discarded. Conversely, Wanjala, Adhiambo and Ngumbi (2013) opined that most schools had (50.7%) printers in good working conditions while 49.3% did not. This means at least most principals were economical on costs especially by having printers though inadequate. There was a statistically strong significant relationship between printer and PTL to integrate ICT in management ($\chi^2 = 66.822$; $p = .001$) and the effect size ($V = 0.50$) was large.

Working scanner(s) was available as stated by 33(12.2%) respondents; available but non functional 141(52.2%) while 96(35.6%) there were none. Since a scanner is not a device that is used in day to day activities, most schools did not have and the few that had were not functional. The current study correlates with Muchiri, Ndirangu and Kanori (2014) study that according to HODs, 62% of schools had no scanners while only 11% had. They observed that the current scenario discouraged principals' efforts to integrate ICT in administration. Principals recognizing the importance of a scanner consider including them in their ever huge budgets. There was a statistically strong significant relationship between a scanner and PTL where ($\chi^2=65.40$; $p=.000$).The effect size was found to be strong as evidenced by (V) =0.49 being large.

Table 4.18 data demonstrated that a lot of photocopier work was done to cut down on costs. The study revealed that photocopier machines were available and working in 37(13.7%) schools, 141(52.2%) were available but not in working conditions and 92(34.1%) schools did not have photocopier. With a photocopier, it's not mandatory that the school must have a computer to run but electricity yes. There was a statistically insignificant relationship between a photocopier and PTL in ICT use($\chi^2=60.156$; $p=.102$) and effect size (V)=0.47 was large. Data from interviews and document analysis revealed that photocopier was cost effective and preferred.

In this information age, surveillance cameras are handy in monitoring security in institutions. However, this study established that majority of PSS were yet to embrace the technology. According only 3(1.1%) had surveillance cameras working, 6(2.2%) had but not working while 261(96.7%) did not have. This study disagreed with Kimuyu, Kalai and Okoth (2016) study which established that 28(100%) of schools had no CCTV camera. Technology leadership goes beyond the ordinary principals' leadership practices but wider thinking to acquire knowledge and

skills through benchmarking. There was a statistically strong significant relationship between integration of a surveillance camera and PTL in ICT use ($\chi^2=251.822$; $p=.001$) and the effect size (V) =0.97 being large.

Internet connectivity was available and functional in 44(16.3%), most schools 181(67.0%) were connected but not in working and 45(16.7%) had no Internet. Some principals failed to meet maintenance costs for Internet connectivity or service providers did not provide connectivity. Most government institutions recommend communication through Internet which necessitates connectivity. Boit, Menjo and Kimutai (2012) asserted that all sample project schools had Internet connectivity but in CDF government schools, it was an issue associated with maintenance, power outages and poor service providers' costs. This study resonated with Kimuyu, Kalai and Okoth (2016) indicated that 20(71.4%) of schools had no Internet. There was a statistically strong significant relationship between Internet connectivity and PTL in ICT use ($\chi^2=138.022$; $p=.000$) and effect size (V)=0.71 was large.

Management software was available and working in 25(9.3%), but 193(71.3%) had non functional software and 52(19.3%) did not. Schools without management software did not perhaps have computers/laptops and non functional were linked to outdated ones. From document analysis donated computers were mostly first generation computers which were not compliant to the new management software in the market. There was a statistically insignificant relationship between management software and PTL in ICT use in class management ($\chi^2=180.867$; $p=.049$) and effect size (V) = 0.82 was large.

4.8.4.2 Organizational and Policy Changes

The CTs responded to a questionnaire to identify organizational and policy changes put in place for ICT use in class management and results were as shown in Table 4.23. Results indicate that there was a statistically significant relationship between PTL and budget for ICT ($p=.000$), qualified ICT technician ($p=.000$), consulting ICT experts ($p=.040$), written plan for ICT ($p=.014$) and staff development in ICT ($p=.000$). However, there was a statistically insignificant relationship between ICT code of conduct ($p=.901$), ICT committee ($p=.079$), school ICT policy ($p=.196$) and PTL in ICT use in class management.

Table 4. 22: Organizational and Policy Changes

Organizational & policy changes (n=270)	AF <i>f</i> (%)	ANF <i>f</i> (%)	NA <i>f</i> (%)	χ^2	p	V
ICT code of conduct	48 (17.8)	174(64.4)	48 (17.8)	117.6	.901	0.66
ICT committee	57(21.1)	184(68.1)	29(10.7)	151.622	.079	0.75
School ICT policy	14(5.2)	70(25.9)	186(68.9)	171.022	.196	0.80
Budget for ICT	118(43.7)	113(41.9)	39(14.4)	43.489	.000	0.40
Qualified ICT technicians	137(50.7)	0(0.0)	133(49.3)	68.067	.000	0.50
Consult ICT experts	183(67.8)	0(0.0)	87(32.2)	71.089	.040	0.51
Written plan for ICT	48(17.8)	174(64.4)	48(17.8)	117.6	.014	0.66
Staff development in ICT	106(39.3)	24(8.9)	140(51.9)	79.022	.000	0.54
Average Effect Size						0.60

Key: AF=Available and Functioning, ANF=Available but Not functioning, NA=Not Available

The ICT code of conduct was available and working in 48(17.8%) schools, available and not working in 174(64.4%) and not available at all as indicated by 48(17.8%). Having an ICT code of conduct prohibits ICT users from sneaking in flash disks, CDs or any other gadget that have virus which sometimes lead to breakdowns. The ICT code of conduct would require that the technology leadership involves staff in formulating one and ensuring that is workable however, from this study finding; ICT code of conduct was in theory rather than practice. This implies that neither ICT committees worked to serve their responsibility nor did PTL make use of them hence such failures. Divergently, it could be interpreted that efforts were made to have such codes in

place but other unknown factors could be a barrier. From document analysis and interviews, it was established that schools with inadequate ICTs like computers, printers and photocopier, teachers freely accessed computers in computer lab or DOS office which defines lack of ICT code of conduct. There was a statistically insignificant relationship between the ICT code of conduct and principal's technology leadership for ICT integration in class management activities where ($\chi^2=117.6$; $p=.901$) and the effect size (V)=0.66 was large meaning ICT code of conduct certainly affect ICT integration especially if users are knowledge poor, lack technical support or virus infected gadgets are used.

The study revealed that functional ICT committee was available in 57(21.1%) schools, a whole 184(68.1%) had non functional ICT committees while 29(10.7%) did not have. A school principal is not an all round expert per se meaning s/he might depend on members' technical input from the ICT committee to make it happen with minimal errors. For this reason, ICT committee teams must be made to work for purposes of achieving set plans for ICT integration in management. However this finding portrays a picture that principal's effort to form ICT committees was not a serious change process as majority of the committees were just on paper hence drawing meaningless formations. There was a statistically insignificant relationship between ICT committee and principals' technology leadership for ICT integration in class management where($\chi^2=151=622$; $p=.079$) and effect size(V) =0.75 was large meaning ICT committees play a critical role in ICT integration.

According to CTs, school policy was available and working as indicated by 14(5.2%), available but not functional 70 (25.9%) and 186(68.9%) did not have. According to CTs' responses, school policy was not available in most schools while a few had. The study finding agreed with Muriko,

Njuguna and Njihia (2015) which established that 58% of principals observed that the school had no ICT policy while 42% had. Adu and Olatundun (2013) argued that principals as technology leaders need to rethink school ICT policies to enable them manage ICT programs as designed to achieve ICT integration. School policy component in most cases escapes principals' knowledge as they strive to bring change. It is for this reason that sometimes integration of ICT is haphazardly done leading to failure in the process. There was a statistically insignificant relationship between school policy on ICT and principal's technology leadership in ICT integration in management ($\chi^2=171.022$; $p=.196$) and effect size (V) =0.80 was large. The school ICT policy is important in the integration of ICT in class management.

The respondents observed that 118(43.7%) schools had budget for ICT, 113(41.9%) had budget but not functional while a minority 39(14.4%) did not have. With or without ICTs, schools budgeted because some outsourced services. From document analysis, schools that did not budget were newly established and as such ICT integration in management was not a priority. Similarly, interviews with principals revealed that with or without ICTs in schools, it was only reasonable that budget for ICT was in place and had a major supporting minute. It was further revealed that even with huge ICT budgets, the PTA supported schools in settling ICT budgets which were parallel to Nangue, Creunen and Church (2011) findings that schools had minimal budgets for TCO. There was a statistically significant relationship between budget for ICT and principal's technology leadership for ICT integration in class management where ($\chi^2=43.489$; $p=.000$) and a large effect size (V) =0.40 signifying the strength between the two variables.

This study findings supported by data from document analysis indicated that most schools with qualified ICT technician meant certificate level as principals were uncomfortable with high

remunerations usually demanded by a more qualified technician. This study agreed with Kukali (2013) assertion that infrastructural changes require funds which was a challenge in most schools to hire a qualified ICT technician. To this end, principals hired lesser qualified persons based on financial implications. There was a statistically significant strong relationship ($\chi^2=68.067$; $P=.000$) between qualified ICT technician and PTL in ICT use in class management and effect size (V)=0.50 was large. The role of an ICT technician in class management was basically to support class teachers where need be.

According to the respondents, 137(50.7%) had qualified technicians while 133 (49.3%) did not have. The technical support involved in handling some ICT equipment would require that principals seek the input of an expert, an expert to mean someone more qualified. The reasons why majority of principals consulted experts was basically because either the school had no hired technician or was less qualified to handle the issue at hand. Thus most principals preferred consulting experts contrary to Kukali (2013) assertion that although 34.38% of schools consulted experts, some principals recorded dissatisfaction in their work. There was a statistically significant relationship ($p=.045$) between consulting ICT experts and principals technology leadership for ICT integration in class management where ($\chi^2=71.089$; $p=.045$)and the effect size (V)=0.51 was large.

The respondents indicated that 48(17.8%) schools had written plan for ICT, 174(64.4%) stated had but not working written plans while 48(17.8%) did not have. A good technology leader understands the changes in technology and pens down plans and use as reference to what is expected for improvement. It was however apparent that principals plans were in written but the implementation did not take off eventually creating a gap between ICT written plans as stated

and expected implementation. Document analysis data showed that written ICT plans were engrained the school strategic plans which was confirmed through interviews. The ICT written plans were nearly meaningless in integration of ICT in class management considering that majority were in paper work and hardly do they narrow down to class management. There was a statistically significant relationship between a written plan for ICT and PTL in ICT use in class management where ($\chi^2=117.6$; $p=.014$) and the effect size (V) =0.66 was large.

Program to support staff for ICT integration was available and functional in 106(39.3% of schools, 24(8.9%) did not have functional ones while 140 (51.9%) lacked such a program. Programs to support staff for ICT integration was lacking in most schools and majority of class teachers acquired ICT skills through workshops. Document analysis and interview schedules data had it that teachers who attended SMASSE programs had the advantage of gaining knowledge and skills since a unit on ICT was usually covered. However, ICT integration was not for SMSSE teachers alone which begs the question, what happens to none SMASSE teachers? This finding corroborates with Al-Sharija (2013) findings that principals in their leadership practices should provide opportunities for individuals to obtain skills for ICT integration. The individualized support would be important in PTL in change to identify knowledge and skill staff needs. The support staff programs for ICT integration could be enhanced by introducing and encouraging harmony among teachers so that they ask questions on the kind of support they would require hence the need to embrace consultative approach. There was a statistically strong significant relationship between support staff for ICT integration and PTL in ICT use in management where ($\chi^2=79.022$; $p=.000$) and the effect size (V)=0.54 was large.

4.8.4.3 Culture Changes

Table 4.24 presents CTs responses on culture change for ICT use in class management. The results portray that there was a statistically significant relationship between PTL and team building ($p=.000$) for ICT use. Nevertheless, there was a statistically insignificant relationship between school vision for ICT ($p=.189$), innovativeness ($p=.098$), merging of ICT activities with school vision ($p=.919$), ICT integration geared towards good management ($p=.406$) and PTL in ICT use in class management activities.

Table 4. 23: Class Teachers Responses on Culture Changes

Culture Changes (n=270)	AF f(%)	ANF f(%)	NA f(%)	χ^2	p	v
School vision for ICT	172(63.7)	80 (29.6)	18(6.7)	133.42	.189	0.70
Innovativeness	51(18.9)	173(64.1)	46(17.0)	114.95	.098	0.65
Merge of ICT activities with school vision	23(8.5)	83(30.7)	164(60.7)	6.200	.919	0.15
ICT integration geared towards good mgt	105(38.9)	72(26.7)	93(34.4)	60.02	.406	0.47
Team building	180(66.7)	81(30.0)	9(3.3)	169.86	.000	0.79
Average Effect Size						0.55

Key: AF=Available and Functioning, ANF=Available but Not functioning, NA=Not Available

A school vision with an ICT focus on integration leads to change in planning, sourcing for funds to facilitate effective integration and encourages teams to be part of the process. However, from the documents, it was revealed that the type of ICT vision in place was not independent per se but usually came up in the school strategic plan. This implies that ICT committees in schools were not as meaningful as required in their responsibilities. This study revealed that there was a statistically insignificant relationship between school vision for ICT integration and PTL in ICT use in class management ($\chi^2=133.422$; $p=.189$); effect size $V= 0.70$ was large.

The onset of technology might require technology leadership to renovate some infrastructure so as to accommodate the needs but again this varies from school to school. This study finding revealed that 51(18.9%) of principals were innovative, 173(64.1%) had innovative ideas that were never put into practice while 46(17.0%) were innovative on matters ICT integration. From interviews, document analysis and observations, most principals were variously innovative as in some schools classrooms were renovated and transformed into computer labs, sharing of available ICTs and use of experts to offer in-service training. This were some of the examples of innovativeness. There was a statistically insignificant relationship between innovativeness as a form of culture change and PTL in ICT use where($\chi^2=114.956$; $p=.098$) and the effect size (V)=0.65 being large. This implies that for innovative principals, there was likelihood that ICT use in class management was in progress.

Merging of ICT activities with school vision was available and functional as indicated by 23(8.5%) CTs, available but not functional as indicated by 83(30.7%) while majority 164(60.7%) did not have such an idea. Merging of ICT activities with school vision would enable principals' plan well according to the needs as portrayed in the vision and points to nothing short of best service delivery. There was a statistically insignificant relationship between merging of ICT activities with school vision and PTL in ICT use in class management ($\chi^2=6.200$; $p=.919$) and the effect size (V)=0.15 was small. This means that even with merging of ICT activities and school vision may not enhance ICT integration in class management.

The majority 105(38.9%) posit integration of ICT geared towards good management program was in functional, 72(26.7%) available but not functional while 93(34.4%) observed that such activity was nonexistent. Seemingly, most principals integrated ICT in management without

necessarily putting in mind the outcome on management practices. The purpose of integrating ICT goes beyond making work easier but to improve service delivery and embrace digitalization so as to enhance global competitiveness. There was an insignificant relationship between ICT integration geared towards good management and PTL in ICT use ($\chi^2=60.022$; $p=.406$) and effect size (V)=0.47 was large.

Team building is central to owning a school program as all staff members participate hence ownership. In the process members learn from each other to gain knowledge and skills for integration of ICT in management functions. There was a statistically significant relationship between team building and PTL in ICT integration in class management where ($\chi^2=169.867$; $p=.000$) and the effect size (V)=0.79 was large. Teambuilding is not easy especially in the wake of new programs and its incumbent upon PTL to ensure that it happens.

4.9 Impact of ICT Integration on Management

On a four point Likert scale, respondents were asked to indicate impact of principals' leadership in integration of ICT and responses were summarized as in Tables 4.25-4.28

4.9.1 Principals' Responses on Impact of ICT Integration on Management

The findings in Table 4.25 revealed that there was effective registration and confirmation of KCSE candidates as indicated by 61 (74.4%), improved communication but the impact was moderate as indicated by 49 (59.8%) and regarding time usage in carrying out management tasks, 43(52.4%) rated high impact.

Table 4. 24: Principals’ Responses on Impact of ICT Integration on Management

Principals responses (n=82)	High		Moderate		Low		None		ΣNifi	MR
	f	%	f	%	f	%	f	%		
Effective registration and confirmation of KCSE candidates	61	74.4	12	14.6	9	11.0	0	0.0	298	3.63
Improved communication	28	34.2	49	59.8	5	6.1	0	0.0	269	3.28
Improved record preparation and keeping	37	45.1	24	29.3	21	25.6	0	0.0	262	3.20
Saves time	43	52.4	28	34.1	8	9.8	3	3.7	275	3.35
Improved work quality	36	43.9	38	46.3	10	12.2	4	4.9	282	3.44
Easier sourcing of information	29	35.4	21	25.6	22	26.8	8	9.8	231	2.82
Cost effective	16	19.5	30	36.6	20	24.4	16	19.5	210	2.56
Enhanced financial accountability	13	15.9	17	20.7	14	17.1	28	34.1	159	1.94
Total									1986	24.2
Average Mean Rating (AMR)										3.03

MR=Mean Rating ; Average Mean Rating (AMR)

The findings in Table 4.25 revealed that that integration of ICT had high impact (74%) in registration and confirmation of KCSE candidates yielding a MR=3.63 which was interpreted as as respondents being in agreement. The principals observed: “ Registration and confirmation of KCSE candidates is a policy guideline by KNEC that the exercise was carried out online. With or without ICTs, we are forced to integrate ICT which has high impact in terms of effectiveness of the exercise”. This study finding corroborates with Wanjala, Odhiambo and Ngumbi (2013) which revealed that schools in Kimilili sub county adhered to KNEC (2012) policy guideline that requires registration and confirmation of KCSE candidates to be executed online”. Being a policy directive, the responses yielded a MR=3.63 which was described as great impact.

According to principals, ICT integration in management had an impact mostly between high and moderate. Principals in justifying their responses observed that until recently communication was done through print and or word of mouth but with the onset of technology, some schools worked

towards catching up with the technological trends of integrating ICT for communication. The presence of improved integration made it easier for principals to communicate with relevant stakeholders regardless of geographical differences through ICTs such as website, email and cellphones. While this study revealed integration of ICT in communication as having moderate impact (59.8%) and yielding a MR=3.2 on management, Musambai, Ndirangu and Mukhwana (2017) findings established that through ICTs, 38.1% agreed that there was massive communication with parents while 33.3% disagreed. The impact would be associated with availability, accessibility and integration of ICTs. The impact of principals' integration of ICT however influenced the recognition of highly improved, fast and easier communication to not only internal recipients but to the external world as well. Principals from as low as 2.4% observed:

“Through technology we have really managed to market and communicate about our schools regarding our academic and co-curricular activity performances. It is worthy noting that website, email and cellphones have reached rapid national expansions and surpassed word of mouth and print in our schools”

Most educational institutions communicated by email and principals do so to be within technologically compliant circles. Integration of emails enhanced quality of management which facilitates an advanced form of interaction among diverse audiences. In the same breath, emails narrow down the digital divide by creating networks that overcome impediments to timely and uniform overflow of information. Communication through ICTs enabled tools, brought to the fore a paradigm shift in improved dissemination of information from a central point to more persons or bodies and vice versa. For instance communication with major stakeholders such as MOE, TSC, KNEC, KEMI and KRA improved with email and cellphones use. Without pointing out to specific ICTs, the current study concurs with Manduku, Kosgey and Sang (2012) findings where 88.1% associated ICT integration with improved communication.

The introduction of the cell phones undermined barriers of class and status and created a rapid and instant transfer of information given its non discriminatory nature to parents or guardians regardless of literacy levels. This observation was however not unanimous due to language barrier especially in county and extra county schools whose catchment area is national. Besides, cellphones recorded an exceedingly fastest and easiest way of disseminating information to and from BOM and PTA members. Divergent views emerged from some principals who argued that with poor network coverage, capacity to regularly charge phones, irregular power supply; individual cellphone ownership and use habits displayed a challenge on effectiveness. Siwel and Malongo (2012) findings in Tanzania resonated with the current findings that using a cellphone saved on time, costs and enhanced interpersonal relationships. This study concluded that inspite of the positive impact associated with cellphones as a communication device; the negative side had equally far reaching effects. In recent times, cellphone has arguably penetrated institutions as the fastest mode of communication through text messages and voice calls. Besides texts are viewed as fairly cost effective, saved on time, promoted interpersonal relationship between school and others, fast and embraced diverse ethnic backgrounds with common language use.

The surveillance camera as a contemporary gadget integrated in management plays an effective role of general monitoring of daily school activities. The respondents observed that embracing surveillance camera would enable communication to interested parties on school activities to a nearly real time experience. A principal quipped “My knowledge on surveillance cameras is that they have capacity to send email notification whenever something peculiar happened in school rather than the ordinary”. Although the CCTV surveillance has the capacity to deter crime in schools, caution on the importance should not be overrated. The cons of a CCTV camera included short lived information and that in cases of crime, criminals might change tact. The

impact was felt only in one school where monitoring was simplified since students, community and staff was in cognizant of its existence and role. One principal observed: “we can not even think of a surveillance camera for the school when we are short of the basic physical facilities, may in future”. Bungoma County had a negligible number of schools with surveillance cameras which reflected either lack of knowledge of the equipment or the cost implications. Although only a small percent indicated impact of principals’ integration of the surveillance camera, this finding was not in agreement with Makhanu and Kamper (2010) findings that no principal in western province had access to surveillance cameras.

Internet connectivity as an important software in crossing borders include major use of more ICTs such as computer, laptop, cellphone, email and website. The government directive that registration and confirmation of KCSE candidate should be an online activity, narrows digital divide between schools, KNEC and other interested parties. Consequently, online registration was described as faster and current means of communication on students’ registration and now transcending into online communication of results hence reduction of mistakes that were commonplace before introduction of ICT. Similarly, Mue, Itegi and Kyalo (2014) finding asserted that both computer and Internet facilitated dissemination of information between school and other learning institutions. Some challenges experienced in integrating Internet included poor service provider and lack of current features in computer and laptop contributed to low impact. This study was further consistent with Muchiri, Ndirangu and Kanori (2014) findings where 60% of schools integrated ICT in registration of KCSE candidates as compliance to KNEC (2012) requirements.

School documentation is one of the core functions of principals’ management responsibilities. In the absence of technology most principals did pen and paper kind of recordkeeping in which

more time and energy was spent however in light of technology, Devices like computers, laptops, flashdisks and email were adopted for recordkeeping. This study established that integration of ICT for recordkeeping had high impact (45.1%) which collectively yielded a MR=3.20 that was otherwise interpreted to mean respondents were in agreement that indeed ICT integration was effective. If not interfered with, ICT storage devices enhanced confidentiality of school information and provided an opportunity for school staff to digitally prepare professional records unlike the past where handwritten preparations consumed more time and energy. This finding concur with Adebisi-Ceasar, Offei and Donte (2014) findings where 50.7% appreciated the understanding that integrating computers in management as meaningful against a majority 74% who linked computers to young people. It was concluded that although age affected respondents' perception of computer as storage, the device was pronounced as valuable in storage capabilities and information retrieval to print, scan or email.

School email address is an equally ideal ICT storage device. The frequent power outages and viruses ignited the storage patterns of important documents on emails besides safety in keeping confidential information and ease retrieval. Most schools had one or more flash disks integrated as storage devices with or without alternatives. Flash disk has the advantage of portability and transferability of stored data to other devices which outsmarts print. Many principals with less established ICTs observed that although the schools were not equipped with basic ICTs, availability of a flash disk did a great job as printing and typing services could be outsourced and work stored safely.

Respondents indicated that a flashdisk as a storage device enhanced data confidentiality as it could only be accessed by the person in possession. The cellphone in its nature has the capacity to process, store and retrieve information when needed. On the contrary, information stored on a

cellphones could easily be erased if malicious individuals accessed it. The low impact was drawn from the inability for some to store information in bulk. A principal asserted that although cellphones are important gadgets but schools can not afford to purchase for every teacher and even if we did confidentiality was subjective.

School information captured on website such as KCSE results and school success stories could be safely stored for future reference and retrieval. Although websites traditionally a static source of information, marketing tool and apparent avenue to school inner secrets, it was rarely visited in day-to-day activities. Many a times the inadequacies voiced with regard to ICT technician failed schools in understanding the value. Since most schools had inactive websites, principals could not categorically state the impact of school websites in practice rather than in theory. One principal whose school had a fairly maintained website courtesy of a well wisher observed “Despite the challenges experienced in developing and sustaining a website, our school website is open to anybody willing to get information about us and this has been a source of information documentation”. The role of website was therefore not limited to internal systems per se but to anybody interested in accessing it.

Surveillance cameras as monitoring devices store captured information which the school management retrieves for scrutiny at will. While Makhanu and Kamper (2010) study revealed that no principal in western province accessed surveillance camera, the current study established that at least 1.2% of the schools had surveillance cameras that surpassed its work of monitoring to information storage. There was minimal theft from within and without schools for fear of being captured and recorded on cameras. The disadvantage of having a surveillance camera was engrained in the cry on limited technical support. The principal facilitates sellers to operate

surveillance cameras making the facility rather costly. The study concluded that impact of surveillance camera on management was inconsequential as most schools were yet to install.

This study concluded that ICT integration in management functions impacted positively in terms of recordkeeping of various students' records, financial records and in few cases stores and library, supplies and meeting minutes. The result is enhanced efficiency in storage of information and retrieval, saved on time and enhanced quality work. Access to ICTs required for recordkeeping would translate into effective, efficient and simplified work as opposed to time consuming pen and paper.

Although integration of ICT in management tasks were expensive in establishment, on the other hand it was understandably cost effective in terms of time spend, financial expenditures and manpower. The study revealed that use of ICT saves time as indicated by 52.4% of the respondents rating impact as high which cumulatively gave a MR=3.35. This according to a principal who stated: "The use of a single computer, printer or photocopy by one person saved a lot more on time to print several papers, less financial costs and use of operating room. The Internet search was fast and easy in global connection, access information that would not be otherwise easily accessible, provided opportunities to engage in online benchmarking which again was cost effective". Accessing a functional computer produces neat work, less time spent, analyzed information, goggle or browse with Internet, smartphone and/ or modem. Internet connectivity provides a chance for principals to research best administrative leadership practices.

In schools with high enrolment, integration of ICT was a big relief with regard to financial costs. With the computer, printer and or photocopier, they typed and printed work in huge numbers at low cost, spends less time and less personnel required. A principal observed "I don't have most

of these ICTs but some of my teachers have computers, laptops and modems. They assist us in networking and doing administrative work like storage on flash disks and email which sometimes compromised confidentiality anyway”. Another one stated

“The fact that staff could not access ICTs in school doesn’t mean we do not do integration. With the email, we visit cyber café and do our work which is very easy and fast plus we store our work safely on flash disks, retrieve and print when required. Its time consuming and sometimes frustrating especially when you want work done immediately but we can proudly say we are equally connected”.

This implied that ICT is either cheap or expensive depending on how one accessed it.

The administrative work presented was much better in terms of quality than when it was handwritten. This was evidenced in work prepared for various functions including but not limited to BOM or PTA or staff meeting minutes, preparation of school budgets, workers’ payrolls, students’ fee balances and in less than two years teachers’ performance records. The findings demonstrated that there was great distinction regarding quality of work with 46.3% indicating moderate impact with MR=3.44 being high; in some cases principals presented work through email, staff whatsapp groups, CDs and or hardcopies. In some cases there was low/ no impact because of lack of devices to improve on work quality. A principal observed “ These ICTs have a great impact on the work quality as opposed to pen and paper write ups as there is minimal cancellations and as we can just delete the unwanted material”.

Some principals with Internet connectivity, modems and or Smartphones had the advantage of browsing information on about anything. Through research, adequate and informed decisions are made, downloading of information and enhanced benchmarking on best management practices through networking. Networking system enables principals get in touch with stakeholder son new trends/policies plus enhanced connectivity to information world over. The responses indicated that there was high impact (35.4%) on integration of ICT in sourcing for information

which together provided a MR= 2.8 that was described as moderate. The mean rating was not collectively rated as high because as per the responses not all principals subscribed to the notion as few still relied on cyber café or borrowed services.

This study established that integration of ICT in management activities was moderate in terms of cost effectiveness as indicated by 36.6% posting a MR=2.5 which was indeed moderate. A principal observed: “ICT is not cost effective at all at least for us in this school as there are so many things that require funds such as acquisition, acquisition of ICT devices, installation, maintenance, hiring of technician among others. This is money and in our case case we cant afford, its costly instead”. In another school, a principal asserted: “We find ICT integration as cost effective since we have most of the devices and a technician who assists in maintenance”. Cost effectiveness therefore depends on the schools economic status and availability of ICTs.

Concerning enhanced financial accountability, there were divided views with a considerable number of respondents holding on no impact while a minimal number indicating presence. The study established that 34.1% of the respondents were of the view that there was no impact on enhancement of financial accountability which gave a MR= 1.94 described as very little impact. The principals attributed the dismal impact to lack of financial management software to assist them monitor for accountability purposes. Through observation, most principals offices neither had computers or laptops where such financial management software would be installed. In the same vein, the impact was distinct in terms of budget and financial year report preparation and fee balances to parents however, the impact on financial accountability was low. This finding corroborates Muchiri, Ndirangu and Kanori (2014) finding that financial reports and budgeting was fast and simplified through ICT integration.

From the findings it was concluded that ICT integration in management functions had a positive impact. In a nutshell, all items according to principals' responses had a high impact except sourcing of information, cost effectiveness in terms of integration which was moderate while financial accountability was basically low. On the Average Mean Rating (AMR=3.03) principals responses revealed that on the overall, impact of ICT integration in management tasks was high. This study concurred with Wanjala, Adhiambo and Ngumbi (2013) on impact of ICT integration in management processes as positive some challenges notwithstanding.

4.9.2 Deputy Principals' Responses on Impact of ICT Integration on Management

Table 4.26 presents DPs responses on impact of principals' leadership in ICT integration. Results in Table 4.26 indicate that ICT integration made it easier for record preparation 111 (52.4%), saved time 112 (52.8%) and improved access to school documents 105 (49.5%) all recorded moderate impact on management activities in DPs' office.

Table 4. 25: Deputy Principals' Responses on Impact of ICT Integration on Management

DPs' Responses (n=212)	High		Moderate		Low		None		ΣNifi	MR
	f	%	f	%	f	%	f	%		
Improved communication	21	9.9	97	45.8	80	37.7	14	6.6	549	2.59
Easier record preparation	19	0.9	111	52.4	68	32.1	14	6.6	559	2.64
Saves time	19	0.9	112	52.8	70	33.0	11	5.2	563	2.66
Faster accessibility to information	7	3.3	74	34.9	71	33.5	60	28.3	452	2.13
Improved record keeping	16	7.5	102	48.1	73	34.4	21	9.9	537	2.53
Improved access to school documents	13	6.1	105	49.5	78	36.8	16	7.5	539	2.54
Effective KCSE registration and confirmation	98	46.2	59	27.8	45	21.2	10	4.7	669	3.16
Faster analysis of exam results	79	37.3	64	30.2	61	28.8	8	3.8	638	3.01
Total									4506	21.25
Average Mean Rating (AMR)										2.66

MR=Mean Rating; Average Mean Rating (AMR)

The DPs in most schools are charged with the responsibility to public relations where they do communication on some issues to particular stakeholders. Earlier on in this study, it was

observed that most DPs had no school cellphones however some were facilitated by principals on airtime for purposes of communication. In this item, 45.6% of respondents rated integration of ICT in their offices as moderate yielding a moderate MR=2.59. The DPs without access to any form of ICT rather than their cellphones, observed that there was no impact. It was assumed that a cellphone was not part of the ICT in their offices although its integration improved communication. This study associated with Oluoch, Ajowi and Bosire (2015) findings where 100% of DPs cited adequate ICT in departments and lack of finances for ICTs (100%) acquisition as limiting factors in usage. To this end, there was low or no impact to DPs office.

Preparation of school records like timetable, duty roster, BOM, PTA and staff meeting minutes and teachers' performance appraisal reports, financial and students' administration is the DP's prerogative. Accordingly ICT integration made it easier for DPs to prepare such records than manual preparation, even so 52.4% of the responses yielded a MR=2.64 which implied moderate impact, demonstrates enthusiasm to integration despite low availability. Muriko, Njuguna and Njihia (2015) study established that 76.6% of principals, DPs and HODs in PSS in Kiambu Sub County knew benefits of ICT integration. For this reason, 71.42% observed that ICT was fast, saves time and was efficient while 51.95% indicated easy for storage and access to information.

Time is a valuable resource in any organization or institution. Integration of ICT in management functions basically saves on time and hastened work process and reduced paperwork hence rendering daily administrative operations effective. Besides administrative work, DPs have other duties to perform hence the need of more time to integrate ICT. This study finding established that 52.8% of the DPs rated the impact of ICT integration in management regarding time as moderate which together provided a MR=2.66. This finding partially corroborated with Wanjala, Adhiambo and Ngumbi (2013) study findings that computer usage saved on time as agreed by a

mean of 4.92. With ICT there was high speed of working and enhanced convenience than paperwork. Official confidential documents are scanned within school as cellphone communication was easy and fast to enhance effectiveness. Inaccessibility to ICTs would certainly require more time accessing, regular power outages and virus infections and lack of prompt technical support could be the reason behind low impact in DPs offices. Well endowed schools with ICTs registered high impact because of easy access, technical support and regular maintenance.

Technology is more often than not associated with change in practices except effective nature of association is determined by the school's ICT status. Consequently, integration of ICT had other demands like adequate infrastructure where schools were hit by acute shortage. The study revealed that 34.9% of the respondents observed that the impact was moderate however, collectively they provided aMR=2.13 which was low in DPs office. This finding disagreed with Muchiri, Ndirangu and Kanori (2014) findings that 70% of DPs accessed ICT to integrate in their offices. Based on this finding, it was concluded that DPs did not access various ICTs however moderate impact was indicative of fairly progressive integration. Through observation checklist it emerged that a better part of DPs did not access various ICTs in their offices hence low impact while document analysis data revealed that under the principle of delegation of duties, some of the administrative tasks meant for DPs were distributed to other staff members. Integration of ICT in preparation of school records enhanced efficiency, competitiveness in technological world and produced quality work.

Accessibility to information with regard to ICT integration is guided by the level of Internet connectivity for enhanced browsing. A school with good Internet connectivity extended to DP's office or available modems enabled DPs retrieve information from Internet to keep abreast with

current MOE or TSC policy issues and trends among others. However due to high costs of maintenance, power outages; poor/slow Internet services, lack or inadequate ICT resources explained the low and no impact ratings in DPs offices. Lack of ICT resources and administrative support affected integration of ICT which in the current study findings could be associated with low and no impact.

According to the results from DPs, there was a moderate impact (48.1%) on recordkeeping with reference to enhanced safety and confidentiality, nature and quality of recordkeeping standards, high speed documentation and retrieval. Due to these favourable benefits, responses collectively yielded a MR=2.53 which was moderate impact and closely followed by some indicating high impact that saw improved efficiency and effectiveness in administrative processes. This finding resonated with Manduku, Kosgey and Sang (2012) study which established that 61.9% of ICT uses for storage of records and 71.4% stating simplified work in the event. The flashdisks, computers and laptops, email or websites had the advantage of storing information on staff, students' registration and important meeting minutes which provided an assurance to easier document retrieval.

Many a times school documents in their traditional form of print disappeared incidentally or accidentally from school but with ICTs, it was unlikely to lose everything. Respondents indicated that ICT integration basically contributed towards easy accessibility to school documents, saved on time as it is easier than searching for hardcopy files. In this regard, majority asserted existence of moderate impact (49.5%) in DP's office which provided a MR=2.54. Access to school documents enhanced management services on time usage and networking. Schools where DPs recorded high impact implied well updated and maintained computers with

Internet connectivity while low or no impact was suggestive of lack or inadequate equipment, inaccessibility or lack of technical support.

In Kenya the government policy on registration and confirmation of KCSE candidates was purely online (KNEC, 2012). In this study, 46.2% of the responses indicated that online registration and confirmation of KCSE candidates posted high impact in the DPs office but collectively yielded a MR=3.16 which was high. In most schools, registration of candidates as a delegated duty is assigned to DOS and depending on the staffing status, DPs carried out registration process. Whoever processed registration was guided by availability and accessibility to updated ICT equipment such as computer or laptop, activated school email address, reliable Internet connectivity services and availability of electricity. This finding was divergent to Mutysia and Mwanja (2017) where DPs' responses did not mention ICT integration in registration and confirmation of KCSE candidates. The impact as a matter of policy, simply complied regardless of whether they accessed ICTs for registration in school or not, somehow it was effectively done. The fact that most schools lack Internet connectivity and computers did not post low impact on KCSE online registration but the office charged with the responsibility.

With mean score as the guiding principle to ensure school management keeps track of students' performance, ICT enable easier and faster analysis of exam results. Most of the computers on purchase come already equipped with software packages such as excel and word which facilitates exam results analysis. A good number of respondents indicated high impact (37.3%) based on the principle of shared responsibilities or for lack of relevant ICTs to do exam analysis. In most schools though exam analysis was under the DPs responsibility, it was done by DOS. Unlike the current study, Muchiri, Ndirangu and Kanori (2014) established that all DPs used ICTs in exam results analysis however the sample consisted of only two respondents unlike the

current study where a large sample participated. According to the DPs, integration of ICT in management activities in their office was moderate with a AMR=2.66. This means with or without ICTs, the office of the DPs tries as much to integrate ICT in management tasks.

4.9.3 Director of Studies' Responses on Impact of ICT Integration on Management

Table 4.27 shows DOS responses on impact of principals' leadership in ICT integration. According to Table 4.27, registration and confirmation of KCSE candidates 73 (68.9%), improved and systematic recordkeeping 57 (53.8%), enhanced communication 64 (60.4%), fast preparation of exam timetable 63 (59.4%), uniform and easy preparation of report cards 67 (63.2%) all had high impact on principals leadership in ICT integration.

Table 4. 26: Director of Studies' Responses on Impact of ICT Integration on Management

DOS Responses (<i>n</i> =106)	High		Moderate		Low		None		ΣNifi	MR
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%		
Accurate registration and confirmation of KCSE candidates	73	68.9	25	23.6	4	3.8	4	3.8	379	3.58
Faster analysis of exam results	61	57.5	26	24.5	20	21.7	10	9.4	372	3.51
Improved and systematic record keeping	57	53.8	22	20.8	11	10.4	16	15.1	332	3.13
Enhanced communication	64	60.4	30	28.3	9	8.5	3	2.8	367	3.46
Quality and clean master timetable	50	47.2	27	25.5	13	12.3	5	4.7	312	2.94
Fast preparation of exam timetable	63	59.4	12	11.3	27	25.5	4	3.8	346	3.26
Uniform and easy preparation of report cards	67	63.2	10	9.4	2	1.9	27	25.5	329	3.10
Improved Internet connectivity	24	22.6	33	31.1	22	20.8	27	25.5	266	2.51
Total									2703	25.5
Average Mean Rating (AMR)										3.19

MR=Mean score rating; Average Mean Rating (AMR)

From the responses in Table 4.27, the DOS integration of ICT in management had an impact and therefore encouraging as this move resonated well with the world in embracing ICT for

effectiveness. The registration and confirmation of KCSE students for the national exam recorded high impact (68.9%) which together provided a MR=3.58 the office of the DOS. This could be attributed to MOE directive to register KCSE candidates on online which corroborates with Wanjala, Adhiambo and Ngumbi (2013) study findings and KNEC (2012) on the directive. The DOS office is concerned with academic activities in school where registration is a part. In a few cases, the impact was notably moderate and low probably because of inadequate ICTs required for integration such as computer, poor Internet connectivity and regular power outages. Alternatively lack of functional software and or perhaps principals or DPs carrying out registration could be contributory factor.

There was improved effectiveness which greatly saved on time and other costs incurred when travelling to KNEC headquarters to submit registration lists. Parents or guardians and students were also in a position to confirm registration status online unlike the past where students' registration status was solely in the hands of principals. None integration of ICT in the office of the DOS was associated with lack of access to ICT resources which agreed with Kula (2010) assertion on barriers to ICT integration as being school level related.

Kenya as a country believes good school management basically means good performance in national exams. For this reason, principals' burnt midnight oil in the administration of numerous examinations in a month, term and year. This enabled them to rate their performance per subject, students and teachers through exam results analysis. This study established that integration of ICT in exam results analysis had a high impact(57.5%) compared to other ratings which responses collectively yielded a MR=3.51 that was interpreted as high impact. From observation and document analysis data, it was evident that the DOS office was better equipped compared to DPs however, some schools lack computers and printers hence DOS used their PCs and cyber

café to process management functions. Integration of ICT in exam results analysis saved on time resource during analysis and printing produces neat and good quality formats. There was enhanced efficiency and tracking of students' records where computers/laptops were used. In this information age, the same results could be submitted to interest parties through relevant ICTs which Oyier, *et al*(2015) concur with but includes national exams like KCSE.

Recordkeeping is for future reference and retrieval where need be. Respondents affirmed that integration of ICT in recordkeeping as indicated by 53.8% that gave an MR= 3.13 had high impact which was evidently trusted and relied upon for effective storage and sort out information. The ICTs in DOS office included flashdisks, computers/laptops and cellphones as information storage. The impact therefore could be identified with easy retrieval and safe storage of information on HODs, subject teachers and students' performance.

As indicated in Figure 4.24, there was evidence of a positive impact as indicated by 60.4% of the respondents on integration of ICT in communication tasks in the office of DOS but collectively gave a MR=3.46. The office of DOS communicated on behalf of the school to KNEC on KCSE registration and confirmation through email. Other forms of communication were to parents regarding their children's registration of KCSE, general school performance and in particular their children's individual performance. Similarly DOS communicated academic performance of the school in particular subjects during academic and parents' days. There was fast communication with little or no language barrier, minimized physical movement to pass information which in the process saved on time. Using ICTs to communicate had its own issues hence low impact or totally none which could be associated with lack or inadequate facilities, poor network and in some cases language barrier. It's less expensive especially where group messages or emails or whatsapp group was faster, enhances networking and teamwork.

Preparation of master timetable enhances coordination and time management, it is less hectic to correct on a computer/laptop generated timetable than handwritten. According to DOS, 47.2% indicated that integration of ICT in preparation of master timetable had high impact however a MR=2.94 was pulled together to give a moderate level. Timetable making especially master timetable is sometimes obtained commercially hence the moderate levels. This study concurs with Manduku, Kosgey and Sang (2012) that ICT integration included timetabling as indicated by 47.62% which made work easier. Despite high impact noted, it was not uniform across schools as in some schools it was either low or totally none which concurs with Muchiri, Ndirangu and Kanori (2013) that 35% of respondents never used ICT in preparation of master timetable.

It is routine in PSS that exams are done first week of opening, monthly and or termly. This necessitates the need for an official timetable for easy coordination to avoid interference with normal learning timetable. Preparation of exam timetable keep teachers posted on which subject comes on when hence prior preparation to meet deadline of setting exams. This study established that 59.4% of respondents asserted that there was high impact in integration of ICT in preparation of exam timetable where all together gave a MR=3.26. Total lack of ICTs led to no impact which was consistent with Quest, Kandjeo and Mushaadja (2014) that lack of computers was one of the barriers to ICT implementation.

Report cards in some schools are electronically generated with a uniform format. Respondents (63.2%) indicated this administrative activity generated higher impact on management by enabling students to carry home report cards without excuses which collectively yielded a MR=3.10. Students' marks were wired to parents/guardians much easier and faster than hand written however this did not apply to all. The exercise saved time, produced quality reports that was less costly and fast to print/photocopy from school.

The DOS office together with the principal's was mostly Internet connected and in rare cases the school laboratory. The 31.1% of DOS rated Internet connectivity as moderate which provided a MR=2.51. Internet connectivity in the DOS office was in position to visit the MOE, TSC and KNEC among others to get updated on latest developments. Similarly, it is easier to access Internet and communicate through email or update website when need be. Internet connectivity therefore saves time and costs in carrying out communication and instruction tasks and data sharing. It is an easier way to institute benchmarking just by click of a button and as a storage facility through email and websites; reliable and enhances safety. The processes enhanced efficiency and effectiveness plus fast and informed decisions.

According to DOS responses on the impact of ICT integration in various management activities in their office, an overall AMR=3.19 was reached which was interpreted to mean high impact.

4.9.4 Class Teachers' Responses on Impact of ICT Integration on Management

The CTs' responses on impact of ICT integration in class management were shown in Table 4.28 Improved students' report cards and 93 (34.4%) communication with stakeholders 105 (38.9%) recorded high impact.

Table 4. 27: Class Teachers’ Responses on Impact of ICT Integration on Management

Class Teachers’ responses (n=270)	High		Moderate		Low		None		ΣNifi	MR
	f	%	f	%	f	%	f	%		
Improved students’ report cards	93	34.4	84	31.1	36	13.3	57	21.1	753	2.79
Improved communication with stakeholders	105	38.9	88	32.6	70	25.9	7	2.6	831	3.08
Fast and easier to enter exam results	45	16.7	62	23.0	96	35.6	67	24.8	625	2.31
Quality and presentable class timetable	18	6.7	77	28.5	83	30.7	92	34.1	561	2.08
Enhanced safety in record keeping	52	19.3	36	13.3	89	33.0	93	34.4	587	2.17
Simplified analysis of students’ performance	29	10.7	59	21.9	71	26.3	111	41.1	546	2.02
Saves time	34	12.6	59	21.9	86	31.9	91	33.7	576	2.13
Improved access to school information	20	7.4	58	21.5	45	16.7	147	54.4	491	1.82
Total									4970	18.4
Average Mean Rating (AMR)										2.30

MR=Mean Rating; Average Mean Rating (AMR)

According to 34.4% of CTs’ responses, ICT was integrated in class management activities where the impact was notably high even so the MR=2.79 collectively could be described as moderate. In other cases the impact ranged from high to low which provided chances of fast processes where applicable, saved on time compared to paperwork, enhanced quality and image of the school in the world of ICT, minimized cheating among students as the same could easily be retrieved. This study was consistent with Wanjala, Adhiambo and Ngumbi (2013) findings where 52.1% of teacher respondents used ICT in preparation of students report forms. The trio argued that such tasks could really be time consuming which consequently interfered with teachers daily routine. To this end, integration of ICT saved substantive time to allow room for teachers to engage in other school activities.

More often than not parents and guardians are interested in knowing the academic progress of their children in school where CTs are better placed to provide reliable information. Unlike the

past one decade where parents or guardians had to visit schools in person, this study established CTs communicated with parents and guardians through cellphone voice calls and text messages. This saved on time as parents/guardians closely followed the progress of their children at the comfort of their homes as teachers communicated with ease. The use of an automated SMS reached many recipients to minimize expenditures in administrative services. Class teachers communicated to subject teachers which encouraged teamwork and consultation as aspects of good management for an all inclusive and informed decision making. The impact rated low in some cases because CTs were at times faced with frustrating issues where phone calls or SMSs went unanswered due to poor network or individual cellphone usage habits. Although this study established that there was high impact in communication as indicated by 38.9%, document analysis data revealed that CTs used individual cellphones and were hardly facilitated leading to minimal communication from teachers side. The MR=3.08 was a revelation that there was improved communication with stakeholders when ICT was integrated at class management.

The findings revealed that there was improved preparation of exam entries and results; however, the impact was low (35.6%) which the responses together yielded a MR=2.31. Despite variations noted in percentage regarding the impact, integration of ICT in this administrative task saved time compared to a situation where teachers applied the traditional paper work and presented neat quality work. It was easier to explain to parents on students' performance when typed and also easier to correct errors when saved in a computer, laptop or flashdisk. However, from observations CTs were more disadvantaged in terms of operating room, inadequacy and inaccessibility to relevant ICTs. This study agreed with Wanjala, Adhiambo and Ngumbi (2013) findings that use of ICTs like computers on preparation of exam entries and results saved teachers time by enabling them perform other duties. Where there was low or no impact might

have been occasioned by the many challenges schools experienced such as inadequate computers, lack of operating room and technical support.

Class teachers are in charge of class management activities like timetable preparations usually drawn from the master timetable which should be presentable and of quality. Apparently timetable preparations in handwritten mode were not a rarity as this study established that according to 34.1% there was no impact which was evidenced in a $MR=2.08$. Integration of ICT in preparation of class timetable provides teachers an opportunity to achieve the objective of having it in class with ease. According to Sharadha, (2016) other reasons that might lead to low or no impact would include unreliability of ICT equipment, lack or inadequacy of ICT equipment meaning other factors were contributory to some extent.

Recordkeeping is part of CTs' professional work and they are required at all times be well prepared and safely kept for future reference. The integration of ICT in class recordkeeping included students' work, discipline records, parents/guardians' contacts among others. Various ICTs were integrated in recordkeeping which brought about the exceptional ability to safely store data, easy access, retrieval and print according to needs and shared electronically to cut on costs. Although ICT integration benefits super cede manual work recording, inaccessibility and unavailability are great impediments to the same. This CTs (34.4%) indicated that integration of ICT in recordkeeping, enhanced safety in terms of storage which collectively provided a $MR=2.17$ that was interpreted to mean low impact.

To track students' performance, teachers are encouraged to analyse every exam or continuous assessment tests students sit for. The CTs affirmed integration of ICT in exam analysis in which a greater number (41.1%) opined that there was no impact which was demonstrated in a

MR=2.02. This implied that where teachers were not able to access equipment there was certainly no impact while the few that integrated, saved on time, presented quality and neat work plus perceived accuracy of work. This ensured safety of exam records in terms of storage, retrieval and reference. Besides, students work could easily be communicated to parents or guardians electronically limits students thought of cheating. While 41.1% in this study indicated low impact, Mue, Itegi and Kyalo (2014) had divergent views where majority stated that 38.7% used ICT on student performance.

Kenya being an exam oriented nation, most secondary schools' arrangement is that students sit for a number of exams before end term exam. To this end; teachers spend a lot of time setting, writing and marking besides their teaching role. The 41.1% of CTs responses revealed that with ICT, there is simplified analysis of students performance, great improvement in work quality, less time spend, energy and manpower to come up with a single paper to be printed or photocopied at low cost. This provided a MR=2.02 which was considerably low. Again from the results, most teachers struggled to integrate ICT in typing and printing of class exams. Document analysis and observation data revealed that there was shortage of computers, printers and photocopiers to enable teachers' process the exams.

The Internet is vital ICT for teachers to access and download information. Class teachers accessing Internet communicate through email, conveniently benchmark at the comfort of their staffrooms and carry out research on professional and educational development in the country at less cost. The respondents (33.7%) indicated that there was no impact in terms of saving time whenever ICT was integrated in class management which collectively evidenced in a MR=2.13 that could be attributed to inaccessibility. Document analysis data revealed that in nearly all schools, Internet was only accessibility to the principal and DOS through use of school modems

hence a hindrance to its usability. This finding was partly divergent from Khan, Has an and Clement (2012) that teachers lack time to integrate ICT because of workload due to understaffing and convergent in the sense that understaffing was a reality in study schools.

The CTs responses on the impact of ICT integration in class management tasks generate an overall AMR=2.30 which was described as moderate. This implies that even if CTs did not have ICTs specifically for their classes, they one way or another management to access ICT and integrated in some class management functions.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the entire study, conclusions made based on the study findings, recommendations emanating from study findings and finally suggestions for further research in the related field of study.

5.2 Summary

This study was designed to assess principals' leadership in ICT integration in PSSM in Bungoma County, Kenya.

5.2.1 Extent of ICT Integration in Public Secondary Schools Management

The study revealed that the extent to which principals' leadership integrated ICT was not uniform across board. Principals indicated that ICT integration was majorly in registration and confirmation of KCSE candidates, communication with stakeholders, maintenance of teachers' performance records, BOM minutes and documentation of school plant. Extent of principals' leadership in ICT integration in DPs office was to a great extent in communication with stakeholders, maintenance of staff meeting minutes, somewhat in advertisement of school tenders and no impact regarding master time table. There was great extent in analysis of exam results, registration and confirmation of KCSE candidates, documentation and maintenance of students' performance records, HODs and professional records, preparation of timetables, communication with stakeholders in the DOS office. Principals' leadership integrated ICT in class management to a great extent through communication with stakeholders.

5.2.2 Factors Influencing Principals' Leadership in ICT Integration

Majority of the principals strongly agreed that financial resources, training in ICT, availability of power, attitude, age, room to integrate ICT influenced their leadership in ICT integration in

management activities. The DPs findings indicated that there was a significant effect of administrative support, technical support, access to ICT equipment, time resource, attitude towards ICT integration and operating room for ICT on principals' leadership in ICT integration. For DOS, financial resources, administrative support, Internet connectivity, technical support, time, age and operating room had significant influence on principals' leadership in ICT integration in office of DOS. The administrative support, technical support, access to ICT equipment, time, operating room had significant effect on principals' leadership in ICT integration in class management.

5.2.3 Principals' Involvement of Stakeholders in ICT Integration

The principals involved stakeholders in ICT integration through various approaches. According to principals, the Parents Teachers Associations (PTA), Members of Parliament (MP), Constituency Development Fund (CDF), Ministry of Education (MOE), School Funds (SF), School Income Generating Activities (SIGA), majorly supported ICT integration in terms of finance while donors and well wishers and other politicians supported the process through equipment provision. DPs responses indicate MOE, PTA, SF, SIGA were involved and responses supported ICT integration financially while donors and well wishers and other politicians provided ICT equipment. The DOS responses cited MPs, PTA and politicians as their involvement yielding financial support while MOE and donors and well wishers yielded ICT equipment support. Class teachers cited financial support from MPs, PTA, SF and SIGA while equipment was through involvement of donors and well wishers and other politicians.

5.2.4 Principals' Technology Leadership in ICT Use

Principals' responses on PTL under infrastructural, organizational and policy and culture changes were variously made to enhance ICT integration. Internet connectivity, printers, flash

disk, computers, school email address, modem, electricity were put in place and functional, management software available but dysfunctional while surveillance cameras and website were not available as infrastructural changes in schools. Under organizational and policy changes, most of the changes were not enacted to facilitate ICT use however budget for ICT, staff development policy and consulting of experts were among available and functional. On culture change not much was available and functional except school vision for ICT and teambuilding for purposes of ICT use. Strategies for ICT development were conspicuously missing, merging of ICT activities and school management and ICT use geared towards school vision.

Results from DPs indicated that under infrastructural changes, there was statistically significant relationships between availability of electricity, operating room for ICT integration, computers and laptops, Internet and management software and PTL in ICT integration in the DPs' office. Under organizational and policy changes, there was a statistically significant relationship between ICT committee and budget for ICT integration and PTL in ICT use. School vision for ICT and strategies for development and training recorded a statistically significant relationship between them and PTL in ICT use in DPs office as aspects of culture change.

According to DOS there were statistically significant relationships between electricity supply, operating room, modem, email address, computer or laptop, flash disk and Internet connectivity and PTL in ICT use as infrastructural changes. Under organizational and policy changes, there was statistically significant ICT committee and consulting ICT experts and PTL in ICT use. There was statistically significant relationships between school vision for ICT, integration of ICT geared towards management, strategies in ICT development and training and teambuilding and PTL in ICT use as aspects of culture.

Under CTs responses on infrastructural changes, there was statistically significant relationship between electricity, operating room, cellphones, modem, email, website, computer or laptop, flash disk, printer, surveillance camera, Internet connectivity and software management and PTL in ICT use in class management. There was a statistically significant relationships between budget for ICT, hiring of qualified technicians, consulting ICT experts, having a written ICT policy and staff development programs and PTL in ICT use in class management as organizational and policy changes. It was also observed that there were statistically significant relationship between strategic ICT development and teambuilding and PTL in ICT use as culture changes to facilitate ICT .

5.2.5 Impact of ICT Integration on Management

The impact of ICT integration on management activities varied from respondent to respondent given that the activities in which ICTs were integrated were dissimilar. According to principals responses, high impact was recorded in effective registration and confirmation of KCSE candidates and improved time management while improved communication with stakeholders was moderate. In the office of the DPs, easier record preparation and time management recorded moderate impact. In the DOS office, the impact was largely high given that it was the busiest office in terms of ICT use; they had accurate registration and confirmation of KCSE exams, fast analysis of exams, improved and systematic record keeping, enhanced communication with stakeholders, quality and clean master timetable, fast preparation of exam timetable and uniform and easy preparation of report cards. In class management, the impact was high in communication with stakeholders and improved students' report cards was high but low impact in fast and easier means of entering students' marks.

5.3 Conclusions

In light of the study findings based on specific objectives, the following conclusions were made:

The first objective of the study sought to establish the extent of principals' leadership in ICT integration in PSSM. Based on the study, it was concluded that ICT was integrated in management activities majorly in registration and confirmation of KCSE candidates and exams, communication with stakeholders, preparation of staff and BOM minutes and documentation of school plant and preparation of timetables were to a great extent.

Under research objective two, the study sought to determine factors influencing principals' leadership in ICT integration in management activities. It was concluded that financial resources, administrative support, power supply, technical support and Internet connectivity were critical in ICT integration as it facilitated TCO of the process. Administrative support which included government support for principals was imperative as they were encouraged to embrace the initiative. There was significant effect between principals' leadership in ICT integration and factors such as administrative support, accessibility to ICT equipment, technical support, time, financial resources and operating room,

The third objective was to assess principals' involvement of stakeholders in ICT integration in school management. Based on the study findings, it was concluded that principals involved stakeholders in ICT integration through mobilization, proposal writing, virement, holding conversations with parents and BOM through CDF, PTA, SF, SIGA and MOE. Majority through principals' leadership depended on PTA projects through which parents supported the program financially which assisted schools in acquisition of ICT equipment and hiring of ICT technicians. The Sub County category of schools that depended on SF and SIGA had less ICT compared to County and National schools category.

The fourth research objective was to analyze PTL in ICT integration in management. It was concluded that both organizational and policy and culture changes were less in place compared to infrastructural changes which showed a missing link between organizational and policy and culture changes as stated and as implemented.

The fifth research objective sought to assess the impact of principals' leadership in ICT integration on management. It was concluded that there was high impact in integration of ICT in management tasks according to principals' responses which collectively yielded an AMR= 3.03 and the DOS office which yielded a MR= 3.19. Nevertheless, in the DPs' office the MR=2.66 which was moderate while CTs response elicited a MR= 2.30 which was interpreted as low impact. There was an aspect of time management, financial costs and production of quality work whenever ICT was available, functional and accessible in school management tasks

5.4 Recommendations

In light of the findings and the conclusions made, the following recommendations were made:

- 1) The extent of principals' leadership in ICT integration was fairly infiltrating into management systems. However, however principals as leaders should be innovative enough and come up with structures to facilitate accessibility to ICT equipment.
- 2) This study recommended that the government through MOE should increase their budgetary allocation to support schools financially to cater for ICT integration in management. The MOE together with policy makers should consider formulating policies on tax waiver on laptops for PSS principals (DOS, CTs, DP, and CTs). Principals should consider budgets that run a TCO process with regard to ICT integration. The TSC should make it mandatory that each registered PSS has a qualified ICT technician.

- 3) The government should support PSS by sensitizing stakeholders on the benefits of ICT integration in management tasks and further support through identification of stakeholders to support schools. Principals should enhance investment in School Income Generating Activities (SIGAs) to facilitate ICTs in schools.
- 4) Through KEMI, an in service program should be mounted in an effort to educate principals on technology leadership demands towards ICT integration in management and the TSC should make it mandatory for school management including all ICT HODs.
- 5) This study recommended that since the impact brought about desirable outcomes regarding service delivery, principals should purpose to acquire the most essential basic ICTs to facilitate integration in DPs, DOS and CTs offices. The government through its relevant bodies like MOE, TSC and other policy makers should come up with policies that provide a framework on ICT integration and its impact on management.

5.5 Suggestions for Further Research

Based on the study findings, further research should be carried out in the following area:

- (i). A comparative study of ICT integration in public and private secondary schools management should be carried out to determine principals' technology leadership in ICT integration.
- (ii). A study should be carried out in public secondary schools incorporating non teaching staff to determine the integration of ICT in management and its subsystems.

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APPENDICIES

Appendix A: Letter of Introduction

Maseno University

School of Education

P.O Private Bag, Maseno

October 2015

Dear respondent,

The undersigned is a researcher carrying out a study on “**Assessment of Principals’ Leadership in Information Communication Technology Integration in Public Secondary Schools Management in Bungoma County, Kenya**”. Your school/ office is among others selected for purposes of taking part in the study by providing information that will be used for this study.

Kindly be as honest as possible while responding to the interview schedule or questionnaires.

Thanks in advance as I look forward for your participation as a respondent.

Yours faithfully,

Kukali Anne Nang’unda

Appendix B: Interview Guide for Principals

1. What is the extent of ICT integration in your school management activities?
2. What factors influence principals' leadership in ICT integration in your school?
3. How do you involve stakeholders in ICT integration in school management? (Probes on stakeholders)
4. What measures have you put in place to enhance ICT integration in your school under infrastructural, organizational and policy and culture changes? (Probes)

Appendix C: Principals' Questionnaire

The purpose of this study is to assess principals' leadership in ICT integration in public secondary schools management in Bungoma County. The information obtained will be treated with utmost confidentiality and only be used for analytical purposes of this study. Kindly be as honest as possible in your responses.

PART 1: Demographic Information

Principal's background information

(a) What is your age bracket? Indicate with a tick ()

Age bracket	Below 30	30-34	35-39	40-44	45-49	50-54	55 and above
Response							

(b) What is your level of training in ICT? Indicate with a tick ()

Level of training	No training	Workshop level	Certificate level	Diploma	Degree and above
Response					

(c) What is your school category? Indicate with a tick ()

School category	National	Extra county	County	Sub county
Response				

PART 1: What is the extent of ICT integration in your school management tasks? Indicate with a tick () your level of agreement

Areas of ICT integration	Greater extent	Some what	Little extent	None
Registration and confirmation of students of KCSE				
Communication with major stakeholders				
Maintenance of teachers' performance records(TPAD)				
Maintenance of BOM minutes				
Documentation of school plant				
Financial records				
Support staff demographic information				
School achievement records				
Research				
Monitoring school activities				

PART 2: Factors influencing principals' leadership in ICT integration in PSSM

(i) Using a scale of 1- 5, where 5=Strongly agree, 4=agree, 3=/Neutral/Undecided, 2=disagree and 1=strongly disagree, indicate your level of agreement on the following factors as influencing your leadership in ICT integration in management of your school?

Factors influencing principals' leadership in ICT integration in management activities	5	4	3	2	1
Financial resources					
Training in ICT					
Administrative support					
ICT management software					
Internet connectivity					
Technical support					
Access to ICT Equipment					
Electricity					
Time Resource					
Attitude towards ICT					
Teachers' age					
Room to integrate ICT					

PART 3: How do you involve stakeholders in ICT integration in school management?

Stakeholders	Describe how you involve each stakeholder in ICT integration		
	Finance	ICT equipments	Human resources
Ministry of Education			
CDF office (M.P)			
PTA			
School Funds			
School income generating activities			
Donors/well wishers			
Politician(s)			

PART 4. What measures have you put in place to enhance integration of ICT in school management under infrastructural, organizational and policy and culture changes to enhance ICT integration? Using a tick () indicate in the boxes appropriately.

(a) Infrastructural Changes

Infrastructural changes	Not Available	Available but not Functional	Available and Functional
Management software			
Internet connectivity			
Surveillance camera			
Photocopier			
Scanner			
Printer			
Flash disk			
Computer/ laptops			
Website			
Surveillance camera			
Email			
Modem			
Mobile phones			
Operating room			
Electricity			

(b) Organizational and policy changes

Organizational and policy changes	Not Available	Available but not Functional	Available and Functional
ICT code of conduct			
ICT committee			
Staff development policy			
Budget for ICT			
Qualified ICT technician			
Consult ICT experts			
Written Plan for ICT			
School ICT policy			
School support for staff ICT devpt			

(c) Culture changes

Culture changes	Not Available	Available but & Functional	Available & Functional
School vision for ICT			
Staff support to improve ICT skills			
Innovativeness			
Merging of ICT activities with school vision			
ICT integration geared towards management			
Strategies for ICT development and training			
Teambuilding for ICT integration			

PART 5. The following are statements concerning the impact of your leadership in the integration of ICT on your school management. On the scale of 1-4 (High-4, Moderate-3, Low-2 or None-1), what is your level of agreement as per the situation in your school?

Impact of principals' leadership in ICT integration on management	4	3	2	1
Improved communication				
Improved recordkeeping				
Saves time				
Simplified record preparation				
Improved quality work				
Easier sourcing for information				
Cost effective				
Enhanced financial accountability				

Thank you for your cooperation

Appendix D: Deputy Principals' Questionnaire

The purpose of this study is to assess principals' leadership in ICT integration in public secondary schools management in Bungoma County. The information obtained will be treated with utmost confidentiality and only be used for analytical purposes of this study. Kindly be as honest as possible in your responses.

Part 1: Demographic Information

Deputy Principal's background information

(a) What is your age bracket?

Age bracket	Below 30	30-34	35-39	40-44	45-49	50-54	55 and above
Response							

(b) What is your level of training in ICT?

Level of training	No training	Workshop level	Certificate level	Diploma	Degree and above
Response					

(c) What is your school category?

School category	National	Extra county	County	Sub county	
Response					

Part 2: Research Questions

(1): What is the extent of ICT integration in management activities in your (DP) office? Indicate with a tick () to show the extent of ICT integration in your (DP) office against the items given below

Statements	Great extent	Somewhat	Very little	None
Advertisement of school tenders				
Preparation of duty roster				
Communication with school stakeholders				
Minutes of staff meetings				
Teacher class attendance records				
Teacher performance appraisal records				
Personal teachers' records				
Maintenance of students' discipline records				
Maintenance of support staff records				
Master time table				

(2):What factors influence principals' leadership in the integration of ICT in management tasks of your (DPs) office? Using a tick indicate your level of agreement on how each factor influences principals' leadership in the integration of ICT in your office.

Key: Strongly Agree(SA-5), Agree(A-4), Undecided(U-3), Disagree (D-2), Strongly Disagree(SD-1)

Statement	SA	A	U	D	SD
Financial resources					
Training in ICT					
Administrative support					
ICT software					
Internet connectivity					
Technical support					
Access to ICT Equipment					
Electricity					
Time resource					
Attitude towards ICT					
Teachers' age					
Room to integrate ICT					

(3):How do principals involve stakeholders in integration of ICT in school management?

Describe how principals involve stakeholder in ICT integration in school management if any.

Stakeholders	Describe how principals involve stakeholders in ICT integration		
	Finance	ICT equipments	Human resources
Ministry of Education			
CDF office (M.P)			
PTA			
School Funds			
School income generating activities			
Donors/well wishers			
Politician(s)			

(4): What measures have principals' leadership put in place in ICT integration in management of your (DPs) office?

In the table below indicate by using a tick (√) to indicate the response for infrastructural changes, Organizational and policy changes and culture changes in DP's office

Part (a): Infrastructural changes

Infrastructural changes	Not Available	Available but not functional	Available & functional
Electricity			
Operating room			
Cellphones			
Modem			
Email			
Website			
Computer/ laptop			
Flashdisk			
Printer			
Scanner			
Photocopier			
Surveillance camera			
Internet connectivity			
Management software			

Part (b) Organizational and policy changes

Organizational and policy changes	Not available	Available but not functional	Available and functional
ICT code of conduct			
ICT committee			
Staff development policy			
Budget for ICT			
Qualified ICT technician			
Consults experts			
Written a ICT policy			
School ICT policy			
Support for ICT policy			

Part (c) Culture changes

Culture changes	Not available	Available but not functional	Available and functional
School vision for ICT			
Staff encouraged to improve their ICT skills			
Innovativeness			
ICT activities consolidated with school vision			
ICT integration geared towards performance			
Provision for ICT strategic development and training			
Teambuilding encouraged for ICT integration			

(5):What is the impact of ICT integration in your (DPs) office on management? Using the given scales High-5, Moderate-4, Low=3 or None-1, tick as per the situation in your office

How does ICT integration in D/P's office impact on school management?	High	Moderate	Low	None
Improved communication				
Easier preparation of school records				
Saves time				
Faster accessibility to information				
Improved record keeping				
Improved access to school documents				
Effective KCSE registration and confirmation				
Faster analysis of exam results				

Thanks for your cooperation

Appendix E: Director of Studies’ Questionnaire

The purpose of this study is to assess principals’ Leadership in ICT integration in public secondary schools management in Bungoma County. The information obtained will be treated with utmost confidentiality and will only be used for analytical purposes of this study. Kindly be as honest as possible in your responses

PART A: Demographic Information

Director of studies background information

(a) What is your age bracket? Indicate with a tick ()

Age bracket	Below 30	30-34	35-39	40-44	45-49	50-54	55 and above
Response							

(b)What is your level of training in ICT? Indicate with a tick ()

Level of training	No training	Workshop level	Certificate level	Diploma	Degree and above
Response					

(C) What is your school category?Indicate with a tick ()

School category	National	Extra county	County	Sub county	
Response					

PART B: Research Questions

(1):What is the extent of ICT integration in management activities in your (DOS) office?

Indicate with a tick () to show the extent of ICT integration in your (DOS) office against the items given below

Statement	Great extent	somewhat	Very little	None
Analysis of exam results				
Registration and confirmation of KCSE candidates				
Students performance records				
HODs records				
Preparation of exam timetable				
Teachers performance records				
Communication				
DOS staff meeting minutes				
Professional records				

(2):The following is a statement on factors influencing principals’ leadership for ICT integration in management of your (DOS) office? Using a tick () indicate your response to mean how these factors influence principals integration of ICT in your office.

Key: Strongly Agree (SA-5), Agree (A-4), Undecided (U-3), Disagree (D-2), Strongly Disagree (SD-1)

Factors influencing ICT integration in DOS office (n=106)	SA	A	U	D	SD
Financial resources					
Training in ICT					
ICT management software					
Internet connectivity					
Technical support					
Admin support					
Access to ICT Equipment					
Electricity					
Time					
Attitude towards ICT					
Teachers’ age					
Room to integrate ICT					

(3):How have principals’ involved stakeholders’ in the integration of ICT in management?

Stakeholders	Describe how principals involve stakeholders in ICT integration		
	Finance	ICT equipments	Human resources
Ministry of Education			
CDF office (M.P)			
PTA			
School Funds			
School income generating activities			
Donors/well wishers			
Politician(s)			

(4):What measures have principals’ leadership put towards ICT integration in DOS management tasks? Using a tick () indicate your response to describe the situation in your office under infrastructural, Organizational and policy and culture changes for ICT integration.

Part (a): Infrastructural changes

Infrastructural changes	Not available	Available but not functional	Available and functional
Electricity			
Solar panel			
Generator			
Modem			
Computers			
Laptops			
Flash disk			
Surveillance camera			
Digital/video camera			
Internet connectivity			

Part (b): Organizational and Policy Changes

Organizational & policy changes	Not available	Available but not functional	Available and functional
ICT code of conduct			
ICT committee			
Budget for ICT			
Staff development policy			
Employed ICT technician			
Consults experts			
Have a written a ICT policy			
School ICT policy			
Support for ICT policy			

Part (c) Culture changes

Culture changes	Not available	Available & not functional	Available& functional
School vision for ICT			
Staff encouraged to improve their ICT skills			
Innovativeness			
ICT activities consolidated with school vision			
ICT integration geared towards performance			
Provision for ICT strategic development and training			
Teambuilding encouraged for ICT integration			

(5).What is the impact of ICT integration on school management?

Indicate how principals' integration of ICT impact on management in your office by ticking against each item to describe your response as per the situation in your office.

Statement	High	Moderate	Low	None
Accurate registration and confirmation of KCSE results				
Faster analysis of exam results				
Improved and systematic recordkeeping				
Enhanced communication				
Quality and clean master timetable				
Fast preparation of exam timetable				
Uniform and easy to prepare report cards				
Improved Internet connectivity				

Thank you for your cooperation

Appendix F: Class Teachers' Questionnaire

The purpose of this study is to assess principals' leadership in ICT integration in public secondary schools management in Bungoma County. The information obtained will be treated with utmost confidentiality and will only be used for analytical purposes of this study. Kindly be as honest as possible in your responses.

PART A: Background Information

(a) **What is your age bracket? Indicate with a tick ()**

Age bracket	Below 30	30-34	35-39	40-44	45-49	50-54	55 and above
Response							

(b) **(b) What is your level of training in ICT? indicate with a tick ()**

Level of training	No training	Workshop level	Certificate level	Diploma	Degree and above
Response					

(c) **What is your school category?Indicate with a tick ()**

School category	National	Extra county	County	Sub county
Response				

PART B: Research Questions

(1):What is the extent of ICT integration in management activities in your class?

Indicate with a tick () to show the extent of ICT integration in your class management against the items given below

Statement	Great extent	Somewhat	Very little	None
Preparation of students' report cards				
Entering and analysis of exam marks				
Mainatenance of records				
Preparation of class timetable				
Communication				
Research				

(2): The following is a statement on factors influencing principals' leadership in the integration of ICT in your class management? Using a tick indicate your response to mean how these factors influence principals' leadership in the integration of ICT in your class management.

Key: *Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), Strongly disagree (SD)*

Factors	SA	A	U	D	SD
Financial resources					
Training in ICT					
ICT management software					
Internet connectivity					
Technical support					
Admin support					
Access to ICT Equipment					
Electricity					
Time					
Attitude towards ICT					
Teachers' age					
Room to integrate ICT					

(3):How have principals involved stakeholders' in the integration of ICT in management?

Stakeholders	Describe how principals involve stakeholders in ICT integration		
	Finance	ICT equipments	Human resources
Ministry of Education			
CDF office (M.P)			
PTA			
School Funds			
School income generating activities			
Donors/well wishers			
Politician(s)			

(4):What measures have principals’ leadership put in place to enhance ICT integration in your class management in school? Using a tick () indicate your response to describe the situation in your class under infrastructural, Organizational and policy and culture changes in ICT integration.

Part (a) Infrastructural changes

Infrastructural changes	Not available	Available but not functional	Available and functional
Electricity			
Solar panel			
Generator			
Modem			
Computers			
Laptops			
Flash disk			
Surveillance camera			
Digital/video camera			
Internet connectivity			

Part (b) Organizational and Policy Changes

Organizational & policy changes	Not available	Available but not functional	Available and functional
ICT code of conduct			
ICT committee			
Budget for ICT			
Staff development policy			
Employed ICT technician			
Consults experts			
Have a written a ICT policy			
School ICT policy			
Support for ICT policy			

Part (c) Culture changes

Culture changes	Not available	Available but not functional	Available and functional
School vision for ICT			
Staff encouraged to improve their ICT skills			
Innovativeness			
ICT activities consolidated with school vision			
ICT integration geared towards performance			
Provision for ICT strategic development and training			
Teambuilding encouraged for ICT integration			

(5): What is the impact of ICT integration on your class management? Indicate how principals' integration of ICT impact on class management by use of a tick () against each item to indicate your response as per the situation in your school.

Statement	High	Moderate	Low	None
Improved on students' report cards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improved communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fast on exam entries and results	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quality and presentable class timetable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enhanced safety in record keeping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easier in analysis of students performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Saves time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improved access to school information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix G: Observation Checklist Guide

This checklist was used to do physical checks on existing ICT equipment, materials and resource in sample schools ($n=82$) by the researcher. This was after seeking permission from the school authority.

PART A: Background information of the School.

1.Name of the school	
2.Category of the school	<ul style="list-style-type: none"> i. National, ii. County iii. Sub- County

Part B: Extent of ICT Integration in management

Areas to observe on the extent of ICT Integration in management			Remarks
Schools Arrangement on regarding ICT			
Availability of ICTs and their integration in management tasks in the following departments	Type of ICTs available	Quantify where applicable	
Principal's office			
DP's office			
DOS' office			
Academic HoDs office			
Accounts department			
Stores department			
Laboratory			
Library			
Class teachers			
Secretarial section			
Security department			
Others			

Appendix H: Document Analysis Guide

Keen interest was undertaken while analysing documents available in sample schools in regard to principals leadership in ICT integration in management of public secondary schools in Bungoma county. The analysis was inline with the study objectives.

PART A: Background information of the School.

1.Document analysis guide identification Number	
2. Name of the school	
2.Category of the school	<ul style="list-style-type: none"> i. National, ii. County iii. Sub- County

1. The following documents were analyzed in sample schools by the researcher

Document	Available	Not available
ICT committee		
ICT Budget		
Written plan for ICT		
ICT code of conduct		
Record on consultation with experts		
Staff development policy		
ICT school policy		
Record of school support for staff development		
Records on types of ICTs in school		
Records on where ICTs are integrated		
National ICT policy document		
ICT equipment acquisition records		
ICT staff establishment		
Minutes as evidence of ICT leaders at Departments		
Records of stakeholders' involvement in ICT integration		

Staff establishment records		
Staff meeting minutes		
BOM meetings		
PTA meeting minutes		
Staff establishment record		

Thanks for your cooperation

Appendix I: Research Permit From NACOSTI

**THIS IS TO CERTIFY THAT:
MS. ANNE NANGUNDA KUKALI
of MASENO UNIVERSITY, 40-50200
Bungoma, has been permitted to
conduct research in Bungoma County**

**on the topic: ASSESSMENT OF
PRINCIPALS LEADERSHIP FOR
INFORMATION COMMUNICATION
TECHNOLOGY INTEGRATION IN PUBLIC
SECONDARY SCHOOLS MANAGEMENT IN
BUNGOMA COUNTY, KENYA.**

**for the period ending:
31st August, 2018**

**Applicant's
Signature**

**Permit No : NACOSTI/P/15/9515/7704
Date Of Issue : 27th August, 2015
Fee Received :Ksh 2000**



**Director General
National Commission for Science,
Technology & Innovation**

CONDITIONS

- 1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit**
- 2. Government Officers will not be interviewed without prior appointment.**
- 3. No questionnaire will be used unless it has been approved.**
- 4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.**
- 5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.**
- 6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.**



REPUBLIC OF KENYA



**National Commission for Science,
Technology and Innovation**

**RESEARCH CLEARANCE
PERMIT**

Serial No. A 6387

CONDITIONS: see back page

Appendix J: Letter of Authorisation From NACOSTI



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

27th August, 2015

NACOSTI/P/15/9515/7704

Anne Nangunda Kukali
Maseno University
Private Bag
MASENO.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Assessment of principals leadership for Information Communication Technology integration in public secondary schools management in Bungoma County, Kenya,*" I am pleased to inform you that you have been authorized to undertake research in **Bungoma County** for a period ending **31st August, 2018.**

You are advised to report to **the County Commissioner and the County Director of Education, Bungoma County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.


SAID HUSSEIN
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Bungoma County.

The County Director of Education
Bungoma County.

Appendix K: Letter of Authorization From Bungoma County Commissioner

REPUBLIC OF KENYA



THE PRESIDENCY

MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Telephone: 055- 30326
FAX: 055-30326
E-mail: ccbungoma@yahoo.com
When replying please Quote

Office of the County Commissioner
P.O. Box 550 - 50200
BUNGOMA

11th September, 2015

REF: ADM/15/13/176

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION.

The bearer of this letter, Anne Nangunda Kukali a student of Maseno University, has sought an authority to carry out a research on "*Assessment of principals leadership for information communication technology integration in public secondary schools management in Bungoma County, Kenya*" for a period ending **31st August, 2018.**

The authority granted to her by the National Commission for science, Technology and Innovation is hereby acknowledged and appreciated.

Any assistance accorded to her in that pursuit would be highly appreciated.

J.K Nang'ole
For: County Commissioner
BUNGOMA COUNTY



Appendix L: Letter of Authorization From Bungoma County Director of Education



REPUBLIC OF KENYA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

State Department of Education – Bungoma County

E-mail: bungomacde@gmail.com

When replying please quote: -

County Director of Education

P.O box 1620 – 50200

BUNGOMA

Our Ref No: BCE/DE/19/VOL. 1/164

Date: 9/8/ 2015

TO ALL
SUB – COUNTY DIRECTORS OF EDUCATION
BUNGOMA COUNTY

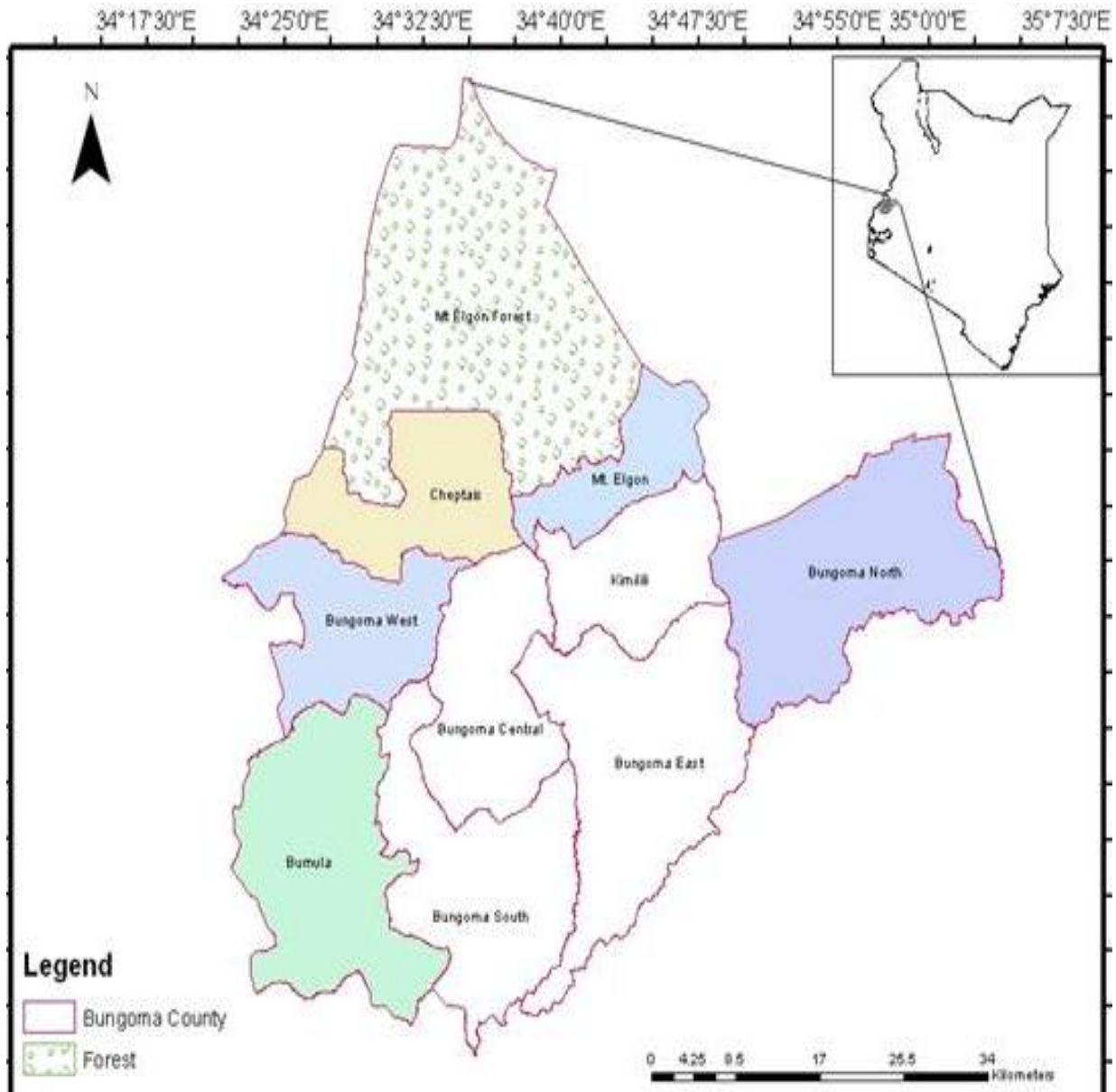
AUTHORITY TO CARRY OUT RESEARCH – ANNE NANG’UNDA KUKALI
ADM. NO. PhD/089/2010

The bearer of this letter Anne Nang’unda Kukali is PhD Student at Maseno University. She has been granted permission to carry out research on *“Assessment of Principals’ Leadership for Information Communication Technology integration in public secondary schools management in Bungoma County, Kenya.”* for a period ending 31st August, 2018.

Kindly accord her the necessary assistance.

CHARLES A. ANYIKA
COUNTY DIRECTOR OF EDUCATION
BUNGOMA COUNTY

Appendix M: Sketch Map of Bungoma County Showing the Study Area



Source: The Kenya Census, 2009 and Kenya National Bureau of Statistics (2009)

Appendix N: Plates

Plate 1: Available but not Functional Computers and Lack of Electricity

Plate 1A: Available computers but not working computers



Plate 1B: showing installation of electricity Plate 1C: showing installation of electricity



Plate 2: Outdated Models of Computers



Plate 3: Piled up computers due to lack of operating rooms

