DESIGN OF ICT INTEGRATION FRAMEWORK IN PRIMARY SCHOOLS: A CASE STUDY OF BUNDIBUGYO DISTRICT, UGANDA

BY

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DECLARATION

I declare that this Thesis is my original work and has not been submitted for any other award of a degree and published at any Institution of Higher Learning.

…… ……

John Ziraba **Date**

APPROVAL

I declare that this Thesis has been done by the student under my supervision and is ready for Viva Voce.

…… **17/10/ 2022**

…… ……

Signed **Date**

DEDICATION

I dedicate this Thesis to my lovely wife and children, and my very supportive parents. May God richly bless and reward you.

ACKNOWLEDGEMENT

First and foremost, I acknowledge Almighty God whose blessings, provision and grace made this academic journey a success story.

Secondly, I acknowledge my supervisor, Dr. Businge Phelix who was very instrumental in guiding me on how best to go about the research subject. His consistent contribution is the reason that this dissertation has reached this stage.

Thirdly, I appreciate the staff of the School of Computing and Mathematics (SOMAC) of Kampala International University for their academic and yet professional support they rendered me when I needed it most. They were readily available for consultation even on the most trivial academic matters.

Fourthly, I am grateful to the head teachers, teachers, and pupils of the selected primary schools in Bundibugyo district that were included in this study, their participation in interview sessions and questionnaire answering made this study a possibility.

I also acknowledge the authors whose works have been cited in this dissertation.

Last but least, I am sincerely grateful to my family members, wife and children, colleagues and friends, May the Almighty God bless them all.

LIST OF ABBREVIATIONS AND ACRONYMS

ADL	Advanced Distributed Learning
ASTD	American Society for Training and Development
BECTA	British Education Communication and Technology Agency
CBT	Computer Based Training
CK	Content knowledge
DL	Distributed Learning
IBT	Internet-Based Training
ICT	Information Communication Technologies
KICD	Kenya Institute of Curriculum Development
LMS	Learning Management Systems
OL	Online Learning
PCK	Pedagogical Content Knowledge
PK	Pedagogical Knowledge
TCK	Technological Content Knowledge
TK	Technology Knowledge
TPACK	Technological Pedagogical Content Knowledge
TPK	Technological Pedagogical Knowledge
WBI	Web-Based Instruction

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ABSTRACT

The purpose of this study was to design an ICT integration framework in Primary Schools in Bundibugyo district. The following objectives guided the study: i) to investigate the factors affecting ICT integration situation in the Primary Schools in Bundibugyo; ii) to design a framework for ICT integration in the Primary Schools in Bundibugyo; and iii) to validate the framework for integrating ICT in the Primary Schools in Bundibugyo District. The study used a cross-sectional research design with a sample size of 189 respondents (60 pupils and 129 teachers). Stratified and simple random sampling were used as sampling techniques while questionnaires and interviews were used as research instruments. The study found that the factors that are affecting the use of integrated ICT in the primary schools in Bundibugyo include lack of teacher preparedness, lack of learners' preparedness, and lack of administrative preparedness. The study recommended that teachers should be made prepared to integrate ICT at primary school level by receiving frequent ICT related trainings. Furthermore, the government in collaboration with district leaders and primary school head teachers should ensure that ICT resources are availed and distributed to schools according to their population. Additionally, the government or the school administrators and Parents Teachers Association (PTA) members should employ ICT technical experts in their schools to help provide technical support such as repair, installation, maintenance, or technical advice to teachers and learners. The learners should be mentally prepared and gradually introduced to integrate ICT in their learning process so that they can grasp the content progressively without getting discouraged or frustrated with the ICT-enhanced learning process.

CHAPTER ONE
INTRODUCTION

1.0 Introduction

This section covers the background of the study, problem statement, purpose of the study, objectives of the study, research questions, scope of the study, significance of the study, and operational definitions of key terms.

1.1 Background to the Study

This section covers the historical perspective, theoretical perspective, conceptual perspective and contextual perspective.

1.1.1 Historical Perspective

The rapid growth in Information Communication Technology (ICT) in the 1960s brought about the birth of e-learning in education system in the United States and European Schools. This brought remarkable changes in the twenty-first century especially in the education sector. This is because Education in the world over has been recognized as an important means for promoting economic and social development both at individual and national levels (Omariba, 2020). By integrating ICT during regular classroom instruction, teachers demonstrate to the students innovative ways of teaching and learning. Countries like United States, Australia, Japan, Malaysia and Philippines have ongoing initiatives on ICT integration in education (Venkatesh et al., 2021).

In most parts of Africa, the purpose of e-learning integration has been to catalyze a pattern shift towards "21st century learning" and support "Education for All" goals at various levels throughout the regions education system (Kiugu, 2020). However, there is no basic infrastructure to enable the integration of e-learning even to provide basic access to digital information. In Kenya, for instance, learning institutions are under increasing pressure to integrate e-learning in teaching and learning given the knowledge and skills needed in the 21stcentury (Mugo, 2017). In spite of this, the challenge confronting the educational system is how to transform the curriculum, teaching and learning process to provide the students and teachers with the skills to function effectively in this digital era (Onyango, 2018). In Zambia, the Ministry of Education endeavors to integrate e-learning in teaching and learning at all levels (i.e. Primary, secondary, tertiary and university) to assist improve the quality of education delivery system and provide

support to alternative electronic stand alone or distance education systems, thereby increasing access to education (Pano, 2020).

In Uganda, despite the recognition e-learning has received at all education levels; there is still very limited adoption and effective utilization (Ahmed et al., 2019). Several e-learning initiatives at the lower education levels, for instance have concentrated on putting into place ICT infrastructure that supports e-learning with very limited emphasis on content development and pedagogical aspects. Notably in partnership with the Ministry of Education and Sports is Uganda Connect-UConnect (2007) which has provided 34 Primary Schools with computers and internet facilities in the urban areas. It comes as no surprise that the ICT facilities in most cases have been used for administrative computing and computer skills development with no activity related to e-learning. This has been attributed to the limited infrastructure and resources, students to computer ratio, lack of online pedagogical skills among others (Pultoo et al., 2020).

And yet integrated e-learning at primary schools in Uganda would facilitate learning and teaching using digital technology as an instructional media. This is because integrated e-learning are capable of providing interactive content through visual cues such as videos, animations, audios, cartoons, exercises and quizzes which eventually improve the learning experiences of pupils (Kiugu, 2020). These activities can be integrated into a lesson plan, offering independent learning programs that can be completed during pupils' own time (Isaboke, 2018). Indeed introduction of integrated e-learning program to institutions of higher learning in Uganda has not been easy. However, at primary school level, sound educational digital learning integration policies coupled with sound leadership, management skills, and framework from school level to the higher level of national policy formulation would ensures proper organization that leads to successful preparations for integrated e-learning in the classroom (Hero, 2020).

1.1.2 Theoretical Perspective

This study adopted TPACK Model for Technology Integration by Mishra and Koehler (2008) for teaching – Technological Pedagogical Content Knowledge. TPACK is a way of thinking about the knowledge teachers need to understand to integrate technology effectively into their classrooms (Mishra & Koehler, 2008). Teachers who exhibit best practices with ICTs are

creative, flexible, and adapt ways in which they navigate the constraints, affordances, and interactions within TPACK framework.

1.1.3 Conceptual Perspective

E-learning denotes the use of ICT by teachers and learners. Schmidt (2005) holds that e-learning consists of conventional training, such as courses, ad-hoc training, selected learning objects, formalization through document collections and community formation which can be achieved via social software.

E-learning is the delivery of training and education via networked interactivity and distribution technologies (Fry 2000; Wild et al. 2002). Other authors notably Roffe (2002); Schank (2002); and Sambrook (2003) describe e-learning simply as learning and communication exercises across computers and networks or for that matter any other electronic sources.

Khan (2005) described e-learning as learning using a number of different technologies and methods for delivery e.g. Computer Based Training (CBT), Internet-based training (IBT), Web-based instruction (WBI), advanced distributed learning (ADL), distributed learning (DL), distance learning, online learning (OL), mobile learning (or m-learning) or remote learning and learning management systems (LMS).

1.1.4 Contextual Perspective

Like other underdeveloped countries, the ICT sector in Uganda is still at the inception stage but growing at a much faster pace witnessed in terms of establishment of an ICT national policy and vision, the increase in Internet accessibility at lower costs, lower costs of device acquisition, Convergence of telecommunications, data processing, and imaging technologies (Kasse & Balunywa 2013). The application of ICT in education is traced right from the lower Primary level, secondary level up to the higher institutions of learning. The government of Uganda has setup various initiatives through which to support ICT inception in education, the notable ones include; *Connect-ED (Connectivity for Educator Development);* supported by USAID, the project is using technology to enable and enhance learning and teaching for Primary educators through the creation of multifaceted approaches to integrating media and computers in the Primary Teacher Colleges (PTC) (Kasse & Balunywa 2013). *U-Connect;* The goal of the Project

is to introduce more widespread use of ICTs in Uganda's Primary and secondary Schools, especially in rural towns. It raises awareness of the benefits of ICT-enhanced Primary and secondary School education, especially the ability to dramatically amplify the limited educational resources in rural towns, and demonstrate best practices in the economical provision of School computer labs and affordable high bandwidth connection to the Internet in a developing country.

This implies that Primary Schools such as those in Bundibugyo District can benefit from such government initiatives if the move is taken seriously by the teachers and School administrators. Bundibugyo District is found in the Toro sub-region of western Uganda. The district has 15 sub counties, 83 parishes and 587 villages. The district has over 198 Schools currently (2020) with 25 Nursery Schools, 157 Primary Schools, 13 secondary Schools, 1 Bivet Schools, and 1 Teachers College. This study will assess the extent to which e-learning has been integrated in the Primary Schools in the district.

1.2 Problem Statement

E-learning integration into the classroom teaching using 3D pictures, videos, and audio tapes, can make pupils' learning more learner-centered and participatory than the conventional learning approach. This is because when pupils watch a 3D animated English language lesson or Mathematics, or Religious education or any other subject, they will be more interested in the motion pictures because it interests them. Accordingly when the teacher explains to them what is in the motion pictures, they will be able to remember it so easily. For example, when ABCD alphabets are given to pupils in lower classes in cartoon format, they will be more interested in learning thus their learning will be enhanced. Unfortunately, majority of primary schools in Uganda, Bundibugyo inclusive still use teacher-centered approach of teaching hence making children less involved and thus making them become consumers of information disseminated by the teachers.

Several factors that hinder the full scale integration of eLearning in the education system of Uganda have been noted to include but not limited to: high cost involved, socioeconomic and technological conditions, lack of a systematic approach to teaching and learning, awareness and attitudes towards digital technologies, administrative and technical support, staff development,

limited infrastructure and little expertise in the use of digital technology tools (Oye et al. 2011); attitude towards the technology, quality of the content in the eLearning and multimedia technology, e-learning and multimedia technology quality, support by ICT technical staff, and stakeholder involvement (Kimwise, Mudaheranwa & Mugabirwe, 2019).

To further compound the lack of eLearning integration in education system of Uganda, there are only a few researches to attest to this fact and the few have been done at the secondary school level (Okidi, 2006), or university level (Kigozi et al., 2011; Kituyi & Tusubira, 2013). To the best of the researcher's knowledge, there is no empirical study on eLearning integration at the primary school level in Uganda. Unfortunately, it is also still difficult to integrate ICT into the primary school setting because of lack of a suitable framework. It was therefore imperative that the current study be done to come up with a comprehensive framework for integrating ICT in primary school setting.

1.3 Purpose of the Study

To design an ICT integration framework in Primary Schools in Bundibugyo district.

1.4 Objectives of the Study

i. To investigate the factors affecting ICT integration situation in the Primary Schools in Bundibugyo.

ii. To design a framework for ICT integration based on the factors that affect the integration in Primary Schools in Bundibugyo.

iii. To validate the framework for integrating e-learning in the Primary Schools in Bundibugyo District.

1.5 Research Questions

i. What are the factors affecting ICT integration situation in the Primary Schools in Bundibugyo?

ii. How can a framework for ICT integration based on the factors affecting the integration in Primary Schools in Bundibugyo be designed?

iii. Is the designed framework for ICT Integration in Primary schools in Bundibugyo applicable?

1.6 Scope of the Study

1.6.1 Geographical Scope

The study was conducted in Bundibugyo District, Uganda which is located in the western region of Uganda. The District is bordered by the District of Kibale in the Northeast, Kabarole in the East and Southeast and by the Democratic Republic of Congo (DRC) to the west. To the north, it shares its boundary with Lake Albert. This study was conducted in 12 out of 157 Primary Schools in Bundibugyo district. The Schools have been selected on the basis of their best performance over the years.

1.6.2 Content Scope

The study was limited to teacher preparedness to use integrated e-learning in the primary schools, learners' preparedness to use integrated e-learning in the primary schools, and administrative preparedness to support integrated e-learning in the primary schools.

1.6.3 Time Scope

The study was conducted for a period of 12 months, from October 2021 to October 2022. The period was important for development of concept paper, proposal writing, field data collection, data analysis, and thesis writing.

1.7 Significance of the Study

It is hoped that the results of this study may assist Schools that intend to integrate ICT in the teaching and learning process to make informed decisions.

Furthermore, the findings of this study will allow successful integration of ICT into the primary education system of Uganda by coming up with a framework which is applicable at primary school level.

The study may also contribute to existing literature on ICT integration in the classrooms in Uganda. More importantly, the study may improve pedagogical practices in Social Studies and Sciences.

Furthermore, the study will be resourceful as a reference source to future researchers who may want to carry out a similar study on a related subject.

1.8 Operational Definition of Key Terms

A framework: refers to a detailed self-assessment instrument for institutions to organize their evaluation of educational technology (e-learning) readiness and opportunities for growth.

E-learning: refers to a sort of digital learning that takes place online using electronic media.

Integration: refers to the act of introducing and using ICT resources in learning processes.

Primary Schools: refers to the first stage of formal education, coming after preschool and before secondary school. In Uganda, it takes seven years to complete Primary School level.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter covers review of literature from different authors, and scholars in accordance to the objectives of the study. The chapter is further subdivided into theoretical review, conceptual framework, and related studies.

2.1 Definition of the Concept of E-Learning Integration

E-Learning as anything delivered, enabled, or mediated by electronic technology for the explicit purpose of learning (American Society for Training and Development (ASTD). It also refers to the technology and services that help create, deliver, and manage those activities (Piskurich, 2003). The American Society for Training and Development's definition of e-Learning covers a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio-and videotape, satellite broadcast, interactive TV, and CD-ROM.

The rapid technological and social change puts forward need for lifelong learning. Conventional classroom learning is not able to satisfy such need. E-learning is an increasingly preferable alternative to conventional classroom learning (Zuleika, 2015). The move to conduct teaching and learning over the Internet is rapidly gaining momentum along with the advance of computing technology and the deep researches into the pedagogical methodology on the Internet. Web based learning has become an important part of the routine landscape of education and training. It has been recognized that Web based learning can enable more learners to have access to the learning materials and provide students and teachers with unprecedented flexibility and convenience (Burden & Shea, 2013). However many current instructional Web sites just simply deliver course materials over the Internet and do not provide effective and efficient supports for using these materials to construct knowledge. As a result, learners only passively receive the presented materials (Omariba, 2016).

Educational systems are thus looking to e-learning programs to help address these challenges and to substantially improve the quality and content of their education. Integrating e-learning into existing Primary educational system can, however, be a major challenge. Primary educational systems in developing countries are undergoing rapid change, particularly an increase in the number of Schools and rise of student enrollment related to the recent emphasis of universal Primary education (Onyango et al., 2015).There is no doubt that the introduction of E-learning to Primary Schools has been one of the most significant developments for teachers and students, yet it seems to have had little effect on the way teachers teach (Kennewell et al., 2007).

At present, E-learning is placed into two categories: *synchronous* and *asynchronous*. Synchronous E-learning imitates a classroom, which entails classes taking place in real-time and connecting instructors and students via streaming audio or video or through a chat room. Asynchronous E-learning lets students' access prepackaged software on their own time, working at their own pace and communicating with a cyber- instructor or even other students through e-mail. In addition, asynchronous E-learning is reflected by School student's use of the Web; practices which involve students connecting to and downloading information (Etherington, 2008).

The number of *asynchronous* E-learning program offerings in the Primary School curriculum has increased dramatically, due to the ease with which Schools and teachers can purchase customized E-programs to fit their curriculum needs. The responsibility for their popularity is that they are flexible, customizable, easy to use and most importantly, cost efficient (Etherington, 2008).

Investment in e-learning is, however, not an alternative to investment in education generally; the two should be seen as being complementary (Dietrich, 2015). Integrating e-learning programs into existing educational systems can promote, however, a transformation. Zuleika (2015) opines that implementing a comprehensive e- learning program would mean changes to the curriculum, infrastructure, teacher professional development, textbooks, and exams. A major benefit of integrating e-learning into governmental educational systems would be, however, a long-term commitment to growing and maintaining the program. The concept of e-learning integration into an educational system begins with the teacher and the ways in which teachers teach.

Al-Ammari & Hamad (2008) explains that in e-learning system, students are able to interact anytime from wherever with different instructional material (text, sound, pictures, video and so on) through Internet. In addition, learners can communicate with teachers and classmates both individually and as a group discussion with the use of message boards, instant message exchanges and video conferencing (Al-Ammari & Hamad, 2008).

Integrating ICT into teaching and learning is a complex process that requires preparedness to make the learning more meaningful and fruitful. As illuminated by Ramirez-Montoya, Mena, and Rodriguez-Arroyo (2017), teachers' preparedness to use ICT in education effectively, together with their digital competence, becomes central and recognized as being a key element for the construction of useful pedagogical knowledge for practice, thus improving students' learning. On the other hand, teachers' acceptance of ICT in teaching also posited a large contribution to ICT integration in education. Wei et al. (2015) showed that Malaysian teachers have a high level of acceptance of ICT integration in teaching. Moreover, teachers' acceptance of technology integration in lessons and the use of innovative techniques to infuse 21st-century skills is vital to ensure the successful implementation of technology integration in the classroom (Pultoo et al., 2020).

Furthermore, the teachers viewed ICT preparedness as a constituent component of digital competence touching upon attitudes or dispositions. Instefjord and Munthe (2017) suggested that teachers' acceptance beliefs influence teachers' acceptance and attitude towards using ICT in education about the topic at stake, including their perceived preparedness. Also, Rokenes and Krumsvik (2016), in their findings, revealed that teacher's preparedness and digital technology integration in the classroom produced a significant correlation. Demirbilek (2009) reiterated that ICT integration would enhance and elevate the student's 21st -century skills, namely critical thinking and problem-solving skills, creativity, collaboration, and communication. Relative to this, Lux et al. (2017) expressed that the introduction of new curricula based on real-world problems brought by technology has provided scaffolding and tools to enhance learning, thus resulting in the unprecedented transformation of schools and classrooms. ICT acts as a catalyst that provides multidimensional ways of facilitating communication and interaction between teachers and students (Pultoo et al., 2020). The integration of ICT in the classroom will help teachers create lessons that allow students to construct their knowledge and improve problem-

solving skills through simulation, manipulation, mind-mapping, guided discovery, and creative expression (Eickelmann & Vennemann, 2017). As an agent of change and a facilitator of learning in the classroom, teachers must be prepared to accept the paradigm shift in learning and teaching because of technology integration (AvidovUngar & Shamir-Inbal, 2017). To sum up, to successfully attain ICT integration in education, all parties must cooperate and participate in infusing ICT in the teaching and learning process (Roblin et al., 2018; Hero, 2019).

Even though ICT integration in education shows potential and advantages in the learning process, still teacher's preparedness seems to develop slowly in attaining its goals in the education process. Still many poor countries face several dilemma and problems in ICT in education. Chai et al. (2011) reported that teachers' preparedness was low in ICT usage in learning processes. ICT integration revealed barriers such as lack of access, resistance to change and its acceptance, lack of time and training, and technical assistance. More so, findings of Rolands (2010) showed that heavy workload, time consuming, inadequate support, insufficient feedback, poor working conditions, and uncompensated work had decreased teachers' motivation towards integrating technology into the classroom. Accordingly, Turel and Johnson's findings (2012) revealed that technical problems could also become major barriers for teachers. These problems include low connectivity, virus attack, and equipment failure. Although technology can bring advancement especially in education, barriers, and hindrances in the teacher's preparedness and acceptance should be more addressed to attain ICT integration in the teaching-learning process successfully.

2.2 Factors affecting ICT integration

2.2.1 Teacher Preparedness

TPACK is a framework that introduces the relationships and the complexities between all three basic components of knowledge (technology, pedagogy, and content) (Koehler & Mishra, 2008; Mishra & Koehler, 2006). At the intersection of these three knowledge types is an intuitive understanding of teaching content with appropriate pedagogical methods and technologies. Seven components are included in the TPACK framework.

They are defined as:

Technology knowledge (TK): Technology knowledge refers to the knowledge about various technologies, ranging from low-tech technologies such as pencil and paper to digital

technologies such as the internet, digital video, interactive whiteboards, and software programs (Koehler & Mishra, 2008).

Content knowledge (CK): Content knowledge is the "knowledge about actual subject matter that is to be learned or taught" (Mishra & Koehler, 2006). Teachers must know about the content they are going to teach and how the nature of knowledge is different for various content areas.

Pedagogical knowledge (PK): Pedagogical knowledge refers to the methods and processes of teaching and includes knowledge in classroom management, assessment, lesson plan development, and student learning (Koehler & Mishra, 2008).

Pedagogical content knowledge (PCK): Pedagogical content knowledge refers to the content knowledge that deals with the teaching process (Shulman, 1986). Pedagogical content knowledge is different for various content areas, as it blends both content and pedagogy with the goal being to develop better teaching practices in the content areas (Koehler & Mishra, 2008).

Technological content knowledge (TCK): Technological content knowledge refers to the knowledge of how technology can create new representations for specific content. It suggests that teachers understand that, by using a specific technology, they can change the way learners practice and understand concepts in a specific content area (Koehler & Mishra, 2008).

Technological pedagogical knowledge (TPK): Technological pedagogical knowledge refers to the knowledge of how various technologies can be used in teaching, and to understanding that using technology may change teaching (Koehler & Mishra, 2008).

Technological pedagogical content knowledge (TPACK): Technological pedagogical content knowledge refers to the knowledge required by teachers for integrating technology into their teaching in any content area. Teachers have an intuitive understanding of the complex interplay between the three basic components of knowledge (CK, PK, TK) by teaching content using appropriate pedagogical methods and technologies (Koehler & Mishra, 2008).

Integrating ICT into teaching and learning is a complex process that requires preparedness to make the learning more meaningful and fruitful. As illuminated by Ramirez-Montoya, Mena, and Rodriguez-Arroyo (2017), teachers' preparedness to use ICT in education effectively,

together with their digital competence, becomes central and recognized as being a key element for the construction of useful pedagogical knowledge for practice, thus improving students' learning. On the other hand, teachers' acceptance of ICT in teaching also posited a large contribution to ICT integration in education. Wei et al. (2015) showed that Malaysian teachers have a high level of acceptance of ICT integration in teaching. Moreover, teachers' acceptance of technology integration in lessons and the use of innovative techniques to infuse 21st-century skills is vital to ensure the successful implementation of technology integration in the classroom (Pultoo et al., 2020).

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Daher, Baya'a, and Anabousy (2018) investigated the Mathematics teachers' ICT integration as an innovative practice. The research findings indicate that the participating in-service mathematics teachers' attitudes and beliefs regarding the benefits of ICT for mathematics teaching were positive at the beginning of the experiment and its end. Simultaneously, teachers' knowledge and experience of using ICT tools in mathematics teaching improved, which contributed positively to the confirmation of their decision to adopt these tools for their classrooms. Hsu (2016) expressed that the majority of the teachers held constructivist pedagogical beliefs about technology integration. Further, teachers who held constructivist pedagogical beliefs about technology use had a high self-efficacy belief about technology integration.

Tsindoli and Opati (2018) conducted a study to assess teacher preparedness for the implementation of eLearning programmes in Emuhaya Sub-county in Kenya. The objective that guided this study include: To establish teachers' preparedness in terms of knowledge, attitudes and skills for implementation of eLearning in public primary school. The sample size comprised 200 class teachers as respondents selected from middle and upper primary. Questionnaires were

administered to class teachers and their responses presented in frequencies and percentages for the purpose of data analysis. The findings of the study revealed that teachers are not well prepared to implement ICT Integration programme therefore a lot of resistance to the programme. The study revealed that the challenges related to ICT integration include: computer illiteracy and phobia, lack of computers and eLearning classrooms, lack of electricity, financing of eLearning programmes, sensitization of stakeholders, accessibility and time for training, old age and attitude. The study recommends that the Ministry of Education should introduce clusters of ICT centres with instructors to man a group of schools. These centres can be used for training teachers from nearby schools.

Isaboke (2018) investigated teacher preparedness for the integration of ICT in teaching lower primary school pupils in Borabu sub-county, Kenya. The sample size was 41 respondents comprising of 10 head teachers and 31 lower primary school teachers, all samples equivalent to 30% of their total population. Questionnaires and interview schedules were used as data collection instruments. The study established that teachers' attitude, teachers' training, teachers' teaching experience and teachers' level of self-efficacy had a positive and significant effect on the integration of ICT in teaching-learning. The findings further revealed that teachers had positive attitudes towards use of ICT but were not ready to use them due to lack of appropriate skills and knowledge. Majority of teachers had been trained in basic computer literacy at certificate level but lacked competence on how to use ICT in teaching-learning. Teachers with more teaching experience had low use of ICT in instruction. Teachers had low levels of self-efficacy due to lack of ICT knowledge. The study recommended that there was need to train all teachers specifically on how to use ICT in instruction, this could be achieved by having teacher training curriculum with content on ICT pedagogy.

Ozen (2012) study looked at distance education for professional development in ICT integration: A study with primary school teachers in Turkey. Content analysis and continuous comparison techniques were used to analyze the data. Teachers reported positive effects in their computer and internet knowledge, skills, opinions and classroom uses of these technologies and in their students' academic achievement levels, use of these technologies and participation in classroom activities.

Similarly, Kamaruddin, Abdullah, Idris and Nawi (2017) studied on Teachers' level of ICT integration in teaching and learning: A survey in Malaysian private preschool. A total 61 teachers from 10 private preschools in the district of Mualim in the state of Perak Malaysia were randomly chosen in this survey research. The findings revealed that most of the experienced teachers were not knowledgeable about the educational ICT application. The findings revealed that the teachers' level of ICT integration is still at the low level.

Kiugu (2020) conducted a study that looked into the integration preparedness on implementation of Digital Learning Integration programme in public primary schools in Meru County. Sloven's formula was used to get a sample size of 396 pupils that formed Focus Group Discussion (FGD) each consisting of 8 learners, and 9 SCDEs were purposively sampled. Questionnaires were used to collect data from head teachers, teachers and PTA while interview schedules and FGDs were used to get data from SCDEs and from learners respectively. The data was analyzed, interpreted and reported using percentages, measures of central tendency. Univariate regression analysis was used to test hypothesis. Qualitative data was analyzed according to themes based on study objectives and reported in narratives. The findings revealed that there is significant positive correlation between teachers' preparedness, adequacy of digital learning resources, effectiveness of technical support staff, and involvement of parents against DLI. The further found that majority of teachers were not trained and those trained were ill prepared. Resources such as tablets, internet connectivity, computer laboratory and electricity were noted to be inadequate. Repairs, maintenance and application of digital learning tools in the classroom were not possible due to lack of technical support staff in schools.

Omariba (2020) conducted a study with perspectives of student teacher trainees' preparedness and adoption on integration of ICTs in public teacher training colleges. The literature review focused on the global overview on integration of ICT in education, status of integration of ICT in education in Africa, readiness in the integration of ICT in education in Kenya and challenges of integrating ICTs in the primary teacher curriculum. A descriptive survey research design was used in the study which was conducted in four (4) public primary teacher training colleges in Central region of Kenya. These provided an ideal population for the study. The target populations were second year student teacher trainees, College principals and Kenya Institute of Curriculum Development (KICD) e-learning Officers. The major research instruments were

questionnaires for student teacher trainees, interview schedule for the principals and Kenya Institute of Curriculum Development e-learning developers, and observation schedule. The obtained data were analyzed systematically using descriptive statistics and presented with the help of frequency tables, figures and percentages. Findings of the study revealed that preparedness on integration of ICTs was at an infant stage. The study also revealed that the training was only offering pedagogy, content, knowledge but not the technology which make integration a reality in the classroom setting. There were inadequate infrastructure to enhance integration and student teacher trainees revealed lack policy that would help adoption on integration of ICTs in teaching learning process.

2.2.2 Learners' Preparedness to Use Integrated ICT

Research that explores the crucial role of affective dimension of learning in ICT developments is still in its infancy. Some of the affective learning factors that have been investigated are bewilderment and confusion (Schaller et al., 2002), fear and alienation (Wegerif, 1998), learners' distress (Hara and Kling, 2000). Another study that adopts holistic perspective investigating the role of emotions in e-learning developments is that of O'Regan's (2003). His study explores an array of emotional states that enlighten the e-learning experience: frustration, fear, anxiety and apprehension, shame/embarrassment, enthusiasm/ excitement and pride. Research evidence clearly verifies the centrality and importance of affective and emotional dimensions in the process of learning while interacting with an e-learning course or environment. One of the most –probably the most- profound affective states intimately linked with learning and instructional design is motivation (Martens et al., 2004). Motivation is a prerequisite for the learner to approach learning offers and also refers to maintaining e-learners to interact with the tasks in the contexts of exploratory learning (Konradt and Sulz, 2001).

It is the skill and attitude of the students and teachers that determines the effectiveness of technology integration into the curriculum (Bitner & Bitner, 2002). Once teachers and students developed skills, they could begin to find ways to integrate technology into the teaching and learning process and demonstrate its use to others. If learning was the impetus that drove the use of technology in the School, teachers and students could be partners in the learning process, altering traditional paradigms of the teacher providing wisdom and the student absorbing

knowledge. Motivation to endure the frustration and turmoil of the process of change needed to be intrinsic.

Newhouse (2002) notes that ICT if used positively enhances learning processes and outcomes. Findings assert that both the learning environment and curriculum pedagogy and content are central to the effective use of ICT (Al-Ammari& Hamad, 2009). However, teachers and students need to be confident in their subject knowledge as well as in basic ICT literacy's so that they can effectively integrate ICT into teaching and learning programmes. A large number of studies have found that students are often more engaged and motivated to learn when using relevant ICT to support specific intentional learning (Gulatee & Combes, 2007; Ani et al., 2008; Odhimabo 2013; Opira 2010).

What students generally do on the way to becoming computer literate is how to memorize the components of ICT and their functions (Hodgkinson et al., 2007). It is a mistake to believe that if students can memorize the hardware parts and software then they will understand and be able to use them. Learners do not acquire a range of learning strategies for successfully accomplishing different kinds of learning tasks (Kohn et al., 2008). Too often, they apply a memorization strategy and when that fails to work they lack alternative strategies to employ. This is especially problematic with ICT, for which memorization strategies simply do not work (Jonassen, 2000). The researcher believes that the most pandemic, yet most insidious, cause for underachievement in ICT is lower expectations on the part of teachers, which reduces expectations of students and the entire educational system.

Government decisions during the Covid-19 pandemic have resulted in the closure of many schools. This has made it necessary for teachers to work online where they face the prospect of designing lessons, homework, assignments and assessment suitable for online learning. Many teachers who report having little or no training in technology are faced with a major change in their practice. Change is usually done in small steps, testing what works and what does not, however the speed of response to the Covid-19 pandemic has not allowed for a slow and steady approach. In effect, almost overnight the nature of teachers' work shifted radically. It moved into unchartered territory where there are no guidelines and where much of what works in person may not work online. Milman (2020) describes this teaching online response to the crisis as Emergency Remote Teaching (ERT) and not just online teaching. Hodges et al. (2020) also

propose that ERT is a more suitable term. Regardless of the terminology, this shift will be challenging for teachers. This move also resulted in a radical shift in student learning. It cannot be assumed that all students will have access to the appropriate technology and home support. We also cannot assume that all teachers will be successful online (Palloff and Pratt 2007), or that all students will be successful online learners (Leidner and Jarvenpaa 1995).

2.2.3 Administrative Preparedness to support ICT integration

Administrative preparedness is the level of readiness by the management of an organization to support a given venture (Soanes, 2006). Administrative preparedness in the context ICT refers to the presence of encouraging ICT-using role models, such as the principal, and the presence of incentives for teachers to use technology (Priscilla et al, 2008). In this study, administrative preparedness refers to the help and guidelines given out by administrators (e.g. chief administrative officer, district inspector of Schools, district education officer, or head teachers) in Primary Schools to aid in computer training and integration of ICT into the curriculum. Sife et al., (2007) reported that administrative preparedness is critical to the successful integration of ICTs into teaching and learning processes. It can be argued that administrators can provide the conditions that are needed, such as putting in place an ICT policy, incentives and resources.

Sife et al., (2003) stated that for the integration of ICTs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, pedagogical, administrative, financial, and social dimensions of ICTs in education. For any institution to adapt to new innovations there must be a backup from administrators (Tusubira &Mulira, 2004). Priscilla et al (2008) stated that guidance from a head of department is very important in encouraging the development of electronic lesson materials to encourage computer use for the specific subject in the teaching-learning environment. The study found out that the success of integrating ICT into the teaching-learning interaction among School teachers depends on the support provided by the principal of the School.

Several past studies had tried to relate administrative preparedness and ICT integration. For example, Mumtaz (2000) and Sife et al., (2007) established lack of administrative, technical and financial preparedness as problems that prevent teachers from using computers in their teaching.

Hawkins (2002) reported that School administrators offer very little structural support and incentives to teachers to effectively use ICT in the classroom. Though lecturers enthusiastically engage in collaborative projects and constructivist pedagogy, administrative preparedness given in reference to ICT is not adequate. On the other hand, Kariuki (2004) argue that teachers use computers more often for their teaching-learning process if they perceived an adequate support from the School administration.

According to Ariho (2011), teachers who receive adequate ICT support from the administrators are more likely to use ICTs in their teaching practice while those who do not receive ICT support from the higher authorities in School are less enthusiastic in using computer or do not integrate technology at all. Administrators in School, such as the head teacher acts as a mediator to integrate ICT into the educational system by playing a key role in encouraging, supporting, and helping the teachers to use computers in their teaching-learning process. Opira (2010) expound that the support of the School head teachers can encourage and promote teachers' willingness to use the computer as a medium to deliver instruction. Thus, the role of the School administrator is crucial in providing the force, support and conditions to enhance the use of computer in the teaching profession (Opira, 2010).

Technology support has a positive impact on educators' own uses of technology, and their integration of ICT into the teaching-learning process (Ariho, 2011). Technical support has been viewed as one of the facilitating conditions that can influence computer usage. Yang (2008) reported lack of technical support as one of the major barriers that resulted in computers being underutilized in the classes. Teachers do not use computers in teaching when they are not sure where to turn for help in case something goes wrong. On the other hand Afshari et al., (2009) stated that Schools should work to convince ICT staff on how ICT integration in classrooms is very important.

Furthermore, Afshari et al., (2009), indicated that with information technology support, teachers are able to access School network, internet and computer accessories (printer, digital camera, data projector, large TV screen, scanner and video camera). They also reported that as beginners of computer use, teachers need technical and training support to assist them in teaching-learning process when they face constraints whereas for competent teachers, they are eager to share their expertise and provide technology support to their colleagues. Thus, lack of technical knowledge

of maintaining the functionality of computers confused teachers to integrate ICT in the classroom. Numerous problems related to ICT infusion occur among the teachers due to the lack of technical knowledge of maintaining the functionality of the computers (Afshari et al., 2009).

Moreover, lack of technical support hinders the implementation of the computer programme. In the investigation of the three-year computer initiative, Priscilla et al., (2008) found that educators were often confused by technical features of using computers for the teaching-learning process. The study reported that problems such as the breakdown of ICT devices and not having enough quick support led to insufficient class time. Teachers, who do not have quick support or lack technical knowledge, encounter problems and frustrations concerning the technical management of ICT tools. Accordingly, teachers need technical assistance as well as pedagogical support such as advice on choosing relevant software and integrating it into a lesson plan. Teachers also need recommendations for ways how ICT can be used to meet educational objectives, along with ideas on how to organize a classroom to take full advantage of only a few computers (Priscilla et al., 2008).

However, it should also be noted that lack of training support by administrators could be identified as a significant barrier towards implementation of computers in classrooms. For instance, a study by Krysa (1998) reported that successful implementation of computers could only occur if administrators offer teachers support and leadership. In addition to administrators developing a philosophy to guide the implementation of computer technology, they can support the technological professional development of teachers by: establishing flexible schedules so that teachers can practice what they have learned (or to continue their learning); encouraging and facilitating team teaching and peer coaching allowing teachers to visit each other's classrooms to observe computer technology integration; and scheduling regular meetings among teachers using technology to plan and evaluate instruction.

Additionally, Hsin-Kai et al., (2007) in a study, found teachers' beliefs about using educational technology in the science classroom in Taiwan positive. The study revealed that although many teachers shared beliefs that educational technology could promote learning and that the use of technology is desirable, they were reluctant to use computers (ICT) because of insufficient support and resources provided by Schools.

Yang (2008) in a case study at Curtin University of technology reported that university teachers who received support from administrators had a high commitment to the adoption of ICT for teaching and learning. Data in the study suggested that the adoption of ICT in teaching and learning would be promoted by greater support of the change at the management level of the University. A crucial factor contributing to the promotion of the innovation is the availability of infrastructure resources: hardware, in terms of the number of computers in the School available for students and teachers for educational purposes, and the quality and functioning of equipment (speed of processors, peripherals and access to the internet) as well as available software.

However, Nachmis et al., (2004) points out that availability of ICT alone is insufficient and must be accompanied by technical as well as pedagogical support. Aryatuha (2007) also noted that the availability of computer hardware and software should be accompanied with training of the users and constant technical support. Without this, even though high quality hardware and software are available, they could be wasted or remain underutilized by the users.

Mbulankende (2007) in his study, assessment of teacher training in ICT in selected universities in Uganda, reported that ICT like most innovations will not work without administrative support. The study suggested that continuous training should provide the support from which teachers can continue to keep and update with ICT and its application to subject pedagogy, in order to enhance their teaching skills. In all levels, Primary teachers should be introduced and trained on how to use various ICT tools common in the classroom such as projectors, computers, electronic white boards, digital cameras and trouble shoot minor problems common with these facilities.

Peansupap and Walker (2005) indicated that the failure of ICT change derives from the traditional beliefs of managers and ICT experts that technology is a magic bullet and so neglect the role of people in any change management task. However, solving technical issues can minimize users' resistance to technological innovation and thus, ICT implementation success is often realized by managers who understand the management of technological change. Thus, if teachers perceive ICT as a beneficial tool, compatible with their current activities, easy to use and have observable outcomes, they could demonstrate positive attitude towards ICT. This can positively influence ICT Implementation in institutions of higher learning.

Munyantware (2006) in his study, "problems affecting teachers' adoption of technology in classrooms among science and mathematics teachers in Kisoro District", found that in addition to social support from colleagues, perceived support from the School influences teachers' adoption decision. The study suggested that continuous support to teachers gives them confidence in using computers in teaching their relevant courses. Likewise, Akankwasa (2008) found out that although many teachers share beliefs that educational technology could promote learning and that the use of ICT is desirable, they are reluctant to use educational ICT because of insufficient support and resources.

For teachers and their students, the availability of modern computers, peripherals, networking and resources within an increasingly diverse range of technologies is an essential part of learning and teaching in the 21stcentury (Onyango et al., 2015). ICT constitutes an input in the student learning process that should help produce better learning output. The availability of ICT resources can enhance learning by making education less dependent on differing teacher quality and by making education available at home throughout the day (Bingimlas, 2009). Furthermore, the availability and use of ICT can help students exploit enormous possibilities for acquiring information for Schooling purposes and can increase learning through communication (Benjamin & Anders, 2011).

According to the Omariba (2016), ICT provide a positive impact on learning and student performance when it becomes an integrated element in the classroom and teaching. Hennessy and Onguko(2010) argue that the availability of visual digital technology (such as animation, simulation and moving images) involves students and reinforces conceptual understanding. ICT use also encourages development from a teacher-focused or teacher-led model to a more student-focused model in which students work together, make their own decisions and take an active role in learning (Omariba, 2016).

Central to the argument of availability are the issues of whether or not the teachers and students have ample and convenient access to computers and their accessories let alone the software that is necessitated in the context of their day-to-day research, collaboration, teaching and student evaluation (Gode, 20103). Furthermore, students and teachers should have confidence in these facilities, which is in turn reliant on the facilities' reliability or degree to which the teachers and

students are sure that they will have access to them at all expected times and utilize them predictably to the betterment of their academic work(Burden & Shea, 2013).

Furthermore, effective integration of ICT in Schools would call for a whole institution to be networked to ensure access to multimedia and learning- rich resources via the School's Intranet and the Internet wherever students and teachers are, in or out of School (Omariba, 2016). The computer labs and classroom computers need to be sufficient in number to allow ready access by students and staff in most subjects across the School. A wide range of peripheral and remote working devices, including video-conferencing, is provided and integrated into the curriculum (Opira, 2015).Despite the above desired situation, most Institutions in Africa face barriers to effective integration of ICT in the teaching and learning process; limited infrastructure in terms of satisfactory physical conditions of laboratories and the subsequent accessibility of the resources (ICT) to the learners (Goktas, 2009).

Many commercial and academic developers of educational multimedia have focused primarily on information access and presentation (Singh, 1993). However, it is easy to see that multimedia has tremendous potential to enhance the vividness with which information can be presented and ease with which it can be accessed, the main barriers to learning are not generally that appropriate information is difficult to access or badly presented. The problem has more to do with that information (Schank & Kass, 1996).

Accessibility and use of ICT allows students to investigate more thoroughly the real world. They can more readily access information sources outside the classroom and can use tools to analyze and interpret such information (Opira, 2010). Information may be accessed through online systems or through data logging systems. The technologies allow them to receive feedback, refine their understanding, build new knowledge and transfer from School to non-School settings (Committee on Developments in the Science of Learning, 1999). In the past this has been difficult to provide in Schools due to logistical constraints and the amount of material to be covered all of which can now be addressed with ICT. What can be learned is broadened and deepened (Schoolnetafrica, 2002).

According to Loveless (2004), barriers associated with ICT integration that fall within the physical realm are beyond the direct control of the teachers. These barriers center on

accessibility and infrastructure and include decisions about purchasing, locations of wiring drops, and decisions regarding the placement of computers in centralized labs verses placement of computer pods in classrooms. Placing computers in centralized labs may provide students with equitable and efficient exposure to technology but severely limit the technology's accessibility for classroom instruction (Loveless, 2004). Labs deny teachers the flexibility of deciding when technology should be incorporated into instruction and may send the message to students that computers are not central to learning or the activities in their classrooms (Omariba, 2016).

In addition, physical limitations of the classroom including size and location of desks, often limit choices of room arrangement and do not provide the space that is necessary to add pods of computers to be used as technology centres (Opira, 2015).According to Bitner and Bitner (2002), information that is accessed but never put to use during that process, may be difficult to retrieve and use when need arises in the real world. Equal attention must be paid to ensuring that the technology is actually being used by the target learners and in ways that truly serve their needs (Salomon, 1994).

2.3 Theoretical Review

2.3.1 TPACK Model

This study adopted TPACK Model for Technology Integration by Mishra and Koehler (2008) for teaching – Technological Pedagogical Content Knowledge. TPACK is a way of thinking about the knowledge teachers need to understand to integrate technology effectively into their classrooms (Mishra & Koehler, 2008). Teachers who exhibit best practices with ICTs are creative, flexible, and adapt ways in which they navigate the constraints, affordances, and interactions within TPACK framework. While we often talk about the integration of ICT into learning, this simple diagram clearly illustrates the complexity and consideration that is required to do so.

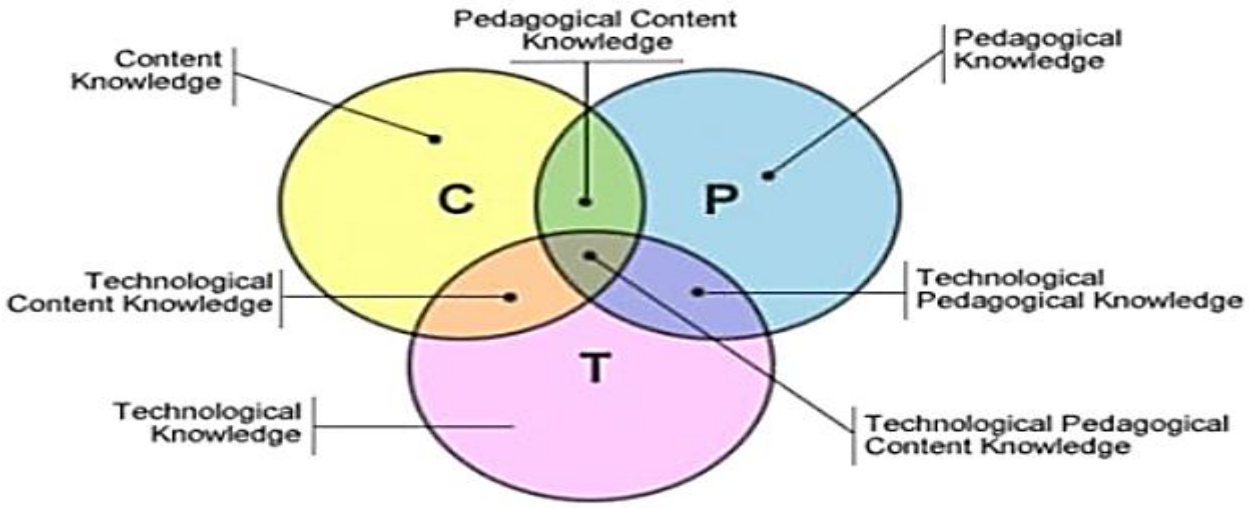


Figure 2.4: TPACK Model
Source: Adopted from Mishra and Koehler (2008)

Integration in this study is the adoption, inclusion and use of resource materials/equipment to aid the process of teaching and learning for meaningful instruction. This study therefore is intended to establish how teachers can develop and apply technological pedagogical content knowledge (TPACK) in their teaching. The framework focuses on designing and evaluating teacher knowledge that is focused on effective student learning in various content areas. Thus, TPACK is a useful framework for planning what knowledge teachers must have to integrate technology into teaching and how they might develop this knowledge. Using TPACK as a framework for measuring teaching could potentially have an impact on the type of training and professional experiences that are designed for Primary teacher training in Uganda. There is a continual need to rethink on our preparation practices in the teacher education field and propose new strategies that better prepare Primary teachers to effectively integrate ICT in their teaching.

The idea of when, where, and how ICT can be integrated to improve teaching and learning form some of the teacher's biggest challenge. The framework targets to propose a technology integration model. It aims to provide teachers with a model for integrating ICT into teaching (Koehler & Mishra, 2008). Even if education and technology providers avail any technology and support integration, it remains the teachers' responsibility to create an environment in which ICTs can be integrated effectively to enhance meaningful instruction.

Mishra and Koehler (2008) model, therefore is envisaged to assist teachers to understand the necessary steps to follow in deciding when, where and how to integrate ICT in their teaching. To empower teaching and learning through guided inquiry, teachers need to integrate ICTs in teaching and learning process. Mishra and Koehler (2008) argue that there is only one way for teachers to determine with continuity whether innovative approaches adopted by them are working; they must apply technological pedagogical content knowledge and improve instructional processes.

2.3.2 E-learning Usability Framework

The e-learning usability framework by Zaharias (2009) is a framework that expands 'traditional' usability constructs with instructional design and motivation to learn. This is because the concept of learner-centeredness is a major concern for usability design and evaluation of e-learning. That is to say, "Knowing the user" is crucial. Treating the user as a learner means focusing on learner's characteristics, learning styles, cognitive and emotional state. There has been considerable research into cognitive aspects of learning but this is not the case with affective dimension and emotions. Ensuring the latter can lead to an important connection that is needed to make e-learners more active and engaged in an e-learning course; that is the affective dimension of learning. Often, the affective dimension is a neglected or underutilized dimension in e-learning developments. It has been argued that affect is the fuel that learners bring to the learning environment connecting them to the "why" of learning. Affect goes beyond simple enjoyment, and it plays a part in the development of persistence and deep interest in a subject (Goleman, 1995).

Therefore, Affective differences exert powerful influences on learners' ability to engage with learning and to progress. Although these findings have been confirmed by modern cognitive science, they are neglected in most of the models and implementations of computer based and web-based learning. If human emotions and affect are essential for human thinking and learning processes, e-learning environments and courses have to intensively consider them if they are to be successful. Interface design as well needs to consider human emotion and affects and especially motivation (Stoney & Wild, 1998).

The two most widely reported challenges for the design of educational technologies are (Bates, 1995): a) the lack of pedagogical support within the educational systems and b) the difficulties experienced by learners in using such systems. Such reasons seem to be valid for the case of e-learning applications and courses. In the same vein under the auspices of ACM's SIGCHI (2001) it has been reported that: a) very little quality control and usability testing has been going into the designing of courses and the design of e-learning technologies, typically due to time constraints and low perceived importance of usability, b) there is a need to focus on how to develop useful and usable tools and environments since so far focus has been more on the technology and not on the pedagogy, and c) there is very little thought at the decision making level to usability issues.

Quinn (1996) opines that usability practice for e-learning needs to be based on a multidisciplinary approach. 'Traditional', generic usability design elements are not sufficient. Software for learning might be usable but not educational or vice versa hence the pedagogical quality of the eLearning design becomes a key concern as illustrated in fig (2) below.

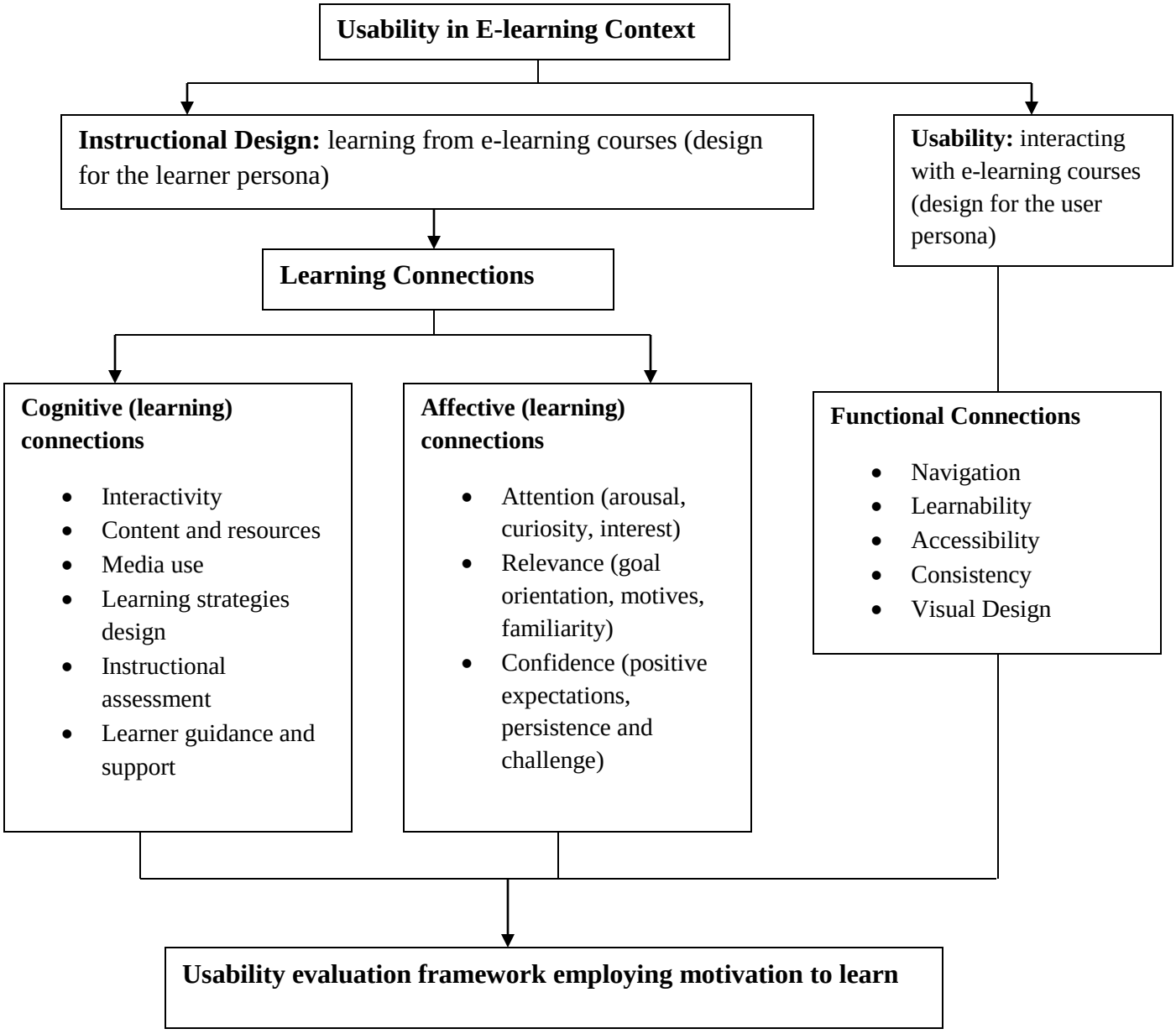


Figure 2.5: A usability framework

Source: Adopted from Zaharias (2009)

The usability parameters as included in fig 2 reflect the required connections: Navigation, learnability, accessibility, consistency and visual design represent the appropriate functional connections of an e-learning course. These functional connections with emphasis on the *form* facilitate the *user persona* while interacting with an e-learning application. In addition Content and Resources, Interactivity/engagement, Media Use, Learning Strategies Design, Instructional Feedback, Instructional Assessment and Learner Guidance & Support represent the appropriate

learning cognitive connections. The latter help the *learner persona* to achieve his/her learning goals while using an e-learning application.

Cognitive (learning) connections

Interactivity

Interactivity is one fundamental way of how learners can be engaged during their learning experience. Interactivity, interaction, and engagement are terms that have been used interchangeably in the literature. Interactivity is difficult to define and even more difficult to implement in terms of instructional design. An interactive e-learning platform provides access to a range of resources (web links, case studies, simulations, problems, examples) appropriate to the learning context and for use in the real world. It also engages the learners in tasks that are closely aligned with the learning goals and objectives.

Content and resources

Content refers to "the subject or ideas contained in something written, said, or represented" (Cambridge University Press, 2001). Content has been a major consideration of instructional designers. The basis of a sound e-learning course should be quality of content or information. By using criteria such as credibility, accuracy, objectivity, coverage and currency, the content information quality should become evident to learners as well as instructors or evaluators (Lanzilotti et al., 2006). In other words, the e-learning platform should cover the subject in sufficient breadth and depth to meet the learning objectives, and the resources should be provided in a manner that replicates as closely as possible their availability and use in the real world.

Media use

Media use has a prominent position in web design and instructional design literature. IBM (2000) provides specific design guidelines so that media elements can be used to enhance usability: a) provide user control, b) inform users of the content and size of media objects, etc.,) use animations to attract attention, and d) use animations to enhance explanation. Despite the fact that multimedia elements such as video and animation could enhance presentation, they should be used properly so as not to affect usability (Zhang et al., 2006). This implies that graphics (illustrations, photographs, graphs, diagrams, etc.,) should be used appropriately, for example, to

communicate visual and spatial concept. Media (text, images, animations, etc.) included should have a strong connection to the objectives and design of the courses.

Learning strategies design

It is imperative for an e-learning designer to take into account how certain learning strategies can be conveyed or facilitated through interface design. Learning strategies refer to how key tenets of learning theories and pedagogies can be practically implemented (Cercone, 2008). For example, the e-learning platform should be able to provide opportunities and support for learning through interaction with others (discussion or other collaborative activities). The course should also be clear to learners what is to be accomplished and what will be gained from its use. In addition, the courses should include activities that are both individual-based and group-based.

Instructional assessment

Instructional Assessment is a major concern when designing any kind of instruction (Govindasamy, 2002). Instructional assessment can provide information about the achievement of learning goals and its results can be used to diagnose learning difficulties and help in planning instruction. The most important thing about instructional assessment is a direct match between stated learning outcomes and what is evaluated (Weston et al., 1999). If learners are often tested on higher order thinking skills, they are likely to adopt the desirable deep holistic approach to e-Learning, while if they are tested on lower-order thinking skills, they would probably be encouraged to practice the atomistic approach to learning (Twomey, 1996). The e-learning platform should provide opportunities for self-assessments that advance learners' achievements. For instance, inclusion of post-tests and other assessments adequately measure accomplishment of the learning objectives in an e-learning platform.

Learner guidance and support

Providing learners with guidance and support is a serious matter in any learning context. E-learning requires learners to adapt to new learning methods (Clark & Mayer, 2003); learners have to master to use browsers, navigate through nonlinear programs, interact with peers, instructors, experts using unfamiliar tools such as chat-rooms, discussion boards and other computer mediated communication (CMC) technologies (Driscoll, 2002). An e-learning platform should ensure that the online help or documentation is written clearly, the online help is screen or context-specific, the courses offer tools (taking notes, job-aids, recourses, glossary etc.) that

support learning, and it should provide support for learner activities to allow working within existing competence while encountering meaningful chunks of knowledge.

Affective (learning) connections

Attention, Relevance, Confidence and Satisfaction (ARCS) Model of Motivational Design proposed by Keller (1983) identifies four essential strategy components for motivating instruction: i) attention strategies for arousing and sustaining curiosity and interest; ii) relevance strategies that link to learners' needs, interests, and motives; iii) confidence strategies that help students develop a positive expectation for successful achievement; and iv) satisfaction strategies that provide extrinsic and intrinsic reinforcement for effort.

Functional Connections

Navigation

Navigation has been considered as an important consideration when designing e-learning. Weston et al. (1999) define navigation as "how the student moves through the instruction and how the instruction is designed to facilitate understanding of organization and structure of content". This implies an e-learning platform should provide learners with the options to choose (easily) what parts of the e-learning application to access, the order and pace of studying. It should also give learners control of their learning activities (studying, exercising, collaborating with other peers etc.). In addition, the e-learning application should allow the learner to leave whenever desired, but easily return to the closest logical point in the course.

Learnability

Learnability refers to "the ease with which new or occasional users may accomplish certain tasks" (Lindgaard, 1994). Learnability problems may result in increased training, staffing, and user support or corrective maintenance costs (Guillemette, 1995). Users must be able to understand navigation options and to use them to locate wanted information. The users should have no problems in remembering how to use and navigate in the system after periods of nonuse. Concerning e-learning design "usability is not the major issue; learnability is", according to Norman (quoted in Feldstein, 2002). In other words, the e-learning platform should provide learners with the option to start the application (locate it, install plug-ins, register, access starting

page) using only online assistance, and it should be clear what learners should do if they get stuck or have questions.

Accessibility

Accessibility is considered to be very important for e-learning applications. Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C) have focused their efforts to the design of accessible web pages and applications for disabled users. For example the provision of text option over images, diagrams etc. will provide visually impaired users to utilize screen reader software to extract the content of the e-learning course. The e-learning platform should have its pages and other components of the application download quickly. The e-learning application should also be easy to install, uninstall and launch. The e-learning application should be free from technical problems (hyperlink errors, programming errors etc.)

Consistency

Consistency is considered as one of the basic web usability factors (Shiratuddin and Hassan, 2001; Lynch and Horton, 1999). Web design should be built on a consistent pattern of modular units that all share the same basic layout grids, graphic themes, editorial conventions, and hierarchies of organization. Design consistency is important to speed up user's learning. It is related to the use of different words, situations, or actions, as well as the use of fonts, text, and element/ features placement (Chua, 2002). Terminology of the functions is used consistently throughout the e-learning application. The fonts, colors and sizes should be consistent throughout the e-learning application. The application should maintain an appropriate level of consistency in its design from one part to another.

Visual Design

Visual design is one of the main characteristics in web design. Visual (or screen) design can be divided into 4 sections: space provision, choice of colour, readability, and scannability (Granic and Cukusic, 2007). Choice of color emphasizes the need to use proper color in web page design not only to attract users but to also improve learnability and ease of use (Powell, 2000). This is also considered valid for e-learning courses and learning environments; graphics and the colors used in an e-learning course should make it easier for the learner to understand the content. This implies that the most important information on the screen should be placed in areas most likely

to attract the learner's attention. In addition, fonts (style, color, saturation) should be easy to read in both on-screen and in printed versions. The online help or documentation should as well be written clearly.

2.3.3 E-learning Integration Model

The E-learning Integration Model by Newton and Ellis (2006) identifies key factors, including organizational priorities, instructors' roles, learners' needs and the learning environment as contributing to an integrated e-learning culture. Furthermore, the model highlights that by accepting that e-learning environments are not value-free, it is possible to understand the competing priorities and discourses that influence how e-learning effectiveness is constructed and defined as illustrated in figure [3].

Organizational Priorities

To support organizational priorities, e-learning policies and infrastructure provision need to be aligned with the training culture of an organization. This implies that training is essential to provide the teachers with the competencies required to meet changing and increasing operational needs. To improve and maintain control of the quality of the e-learning products, it is necessary to train teachers with specialized instructional design and courseware development. Therefore, if a centralized e-learning infrastructure is established for instance by the government, it supports hierarchical policy development, funding, design, development and distribution processes which can maintain the sustainability of e-learning infrastructure despite frequent staff changes (Ellis & Newton, 2004). Aligning e-learning organizational structures with the hierarchical organizational culture encourages integration into training programs and the development of sustainable management processes and infrastructure. In addition, standardizing content and delivery through e-learning packages provides more structured and consistent course delivery than traditional face-to face classroom delivery.

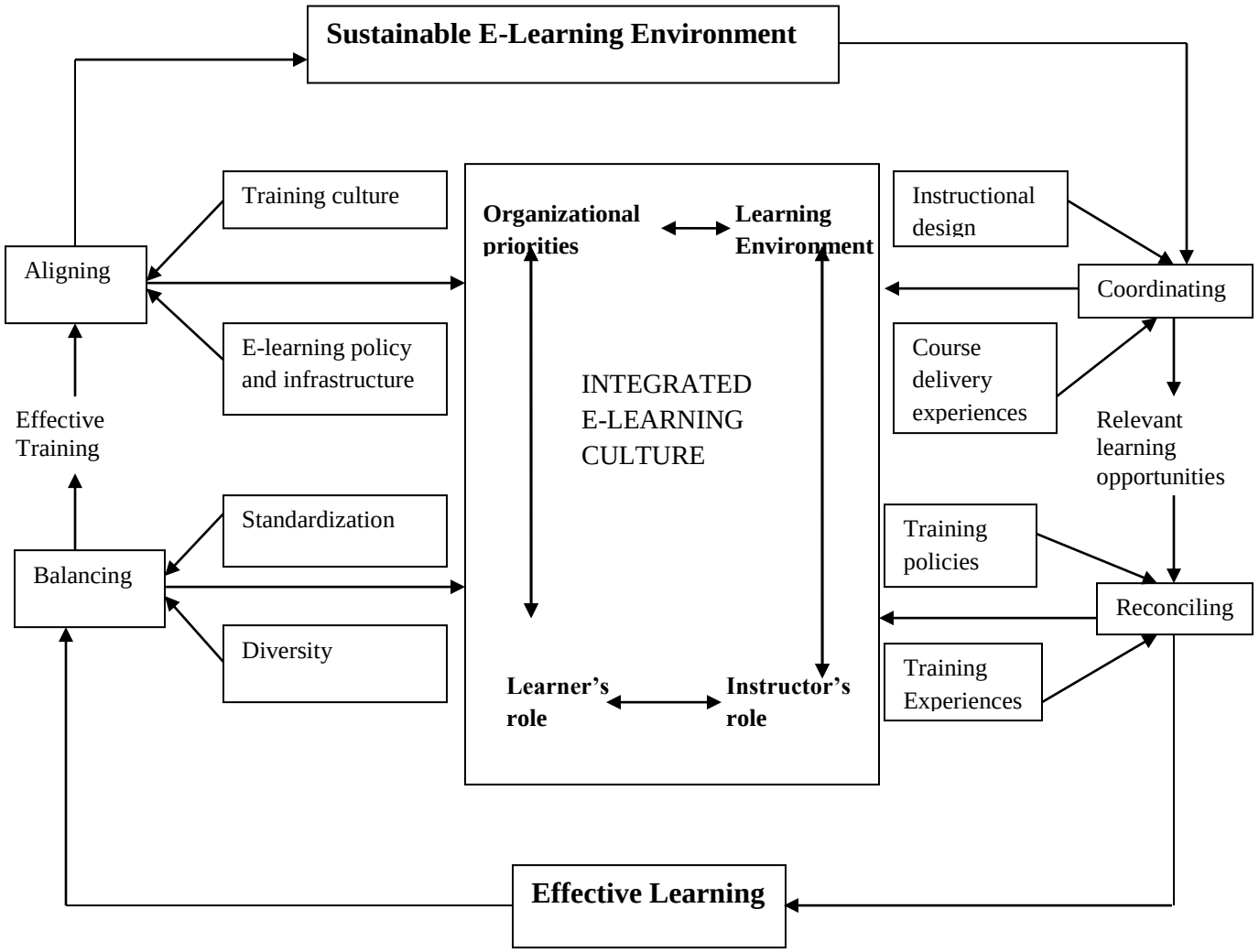


Fig 2.6: E-learning Integration Model

Source: Adopted from Newton and Ellis (2006)

Learning Environment

Under the learning environment, the influence of organizational structures provided for e-learning design, development and delivery stages on the learning environment should be recognized. To support the learning environment and encourage relevant learning opportunities, there needs to be coordination between course design and delivery expectations, policies and practices. Establishing the role of e-learning design and delivery within the training culture facilitates acceptance of e-learning in training programs. Understanding the learning culture of the organization and how this is applied to e-learning design and delivery processes also informs the development of an integrated e-learning culture. However, a lack of collaboration between

the design and delivery stages of e-learning creates tensions in the learning environment in the event of limited band width or inadequate computer access.

Instructors' Role

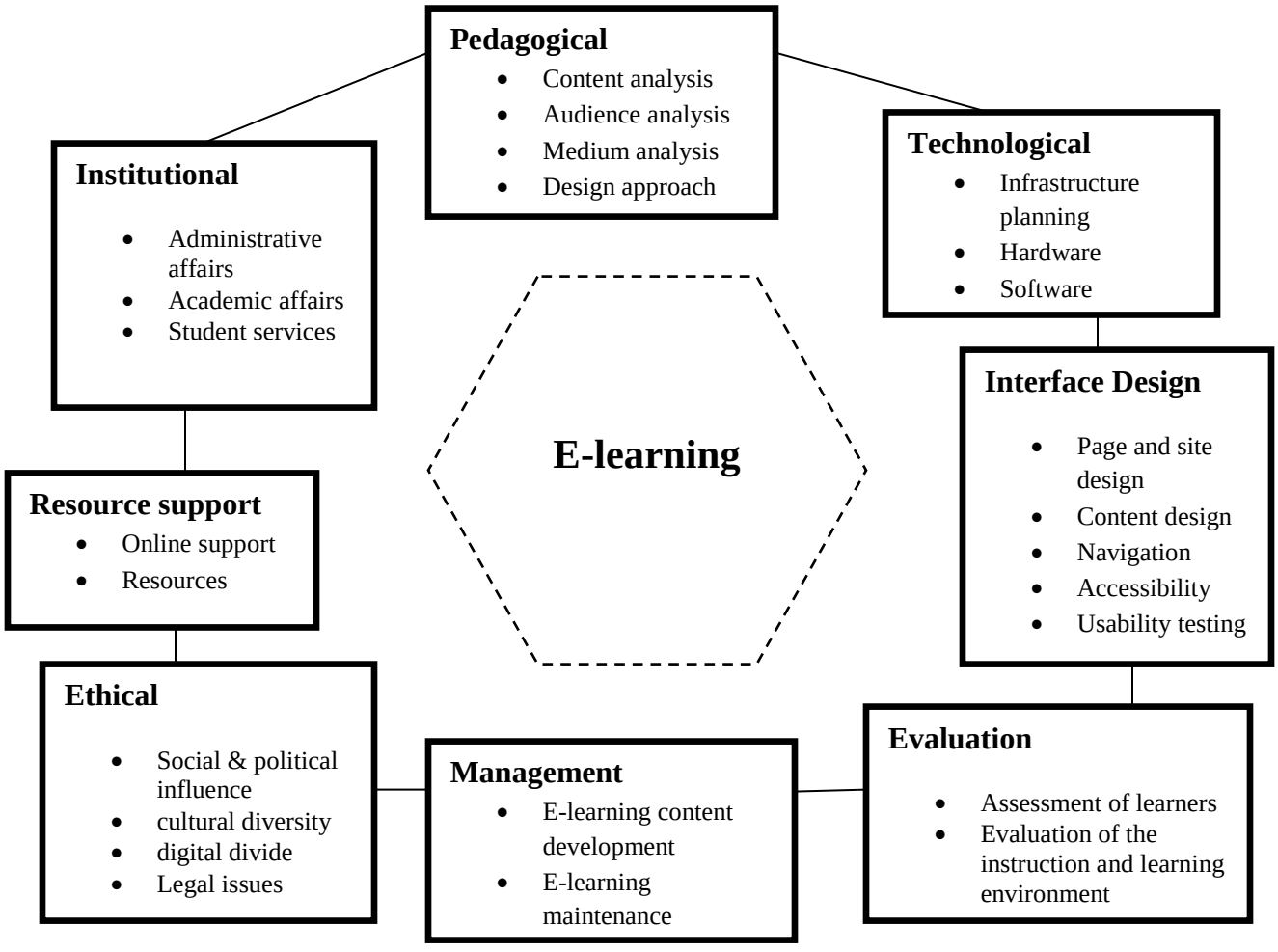
Instructors in workplaces can provide a vital role as the implementers of e-learning packages. There needs to be reconciling processes between training policies and instructors' experiences to inform the development of instructors' roles to develop relevant and effective learning opportunities. Changes in the instructors' role which potentially threaten traditional roles and positions in the organization can lead to resistance. E-learning facilitation in the classroom thus should be associated more with providing technical assistance than with learning new teaching skills. Instructors are also in a direct position to be able to influence student perceptions and use of e-learning. With a sense of erosion of skills and position, there can be direct consequences in how e-learning is presented to students and subsequent course feedback (Newton & Ellis, 2005).

Learners' Needs

E-learning platform provides the opportunity for schools to provide standardized training to dispersed employees. Balancing requirements to standardize training and respond to diversity across the organization should inform understanding of learners' needs and encourage effective training outcomes. However, local diversity in learning requirements and technical infrastructure can influence the effectiveness of standardized training. Feedback from students can provide insights into e-learning experiences and highlight areas where different learning approaches may be required. Learners with computer literacy skills may find the use of e-learning easier compared to their counterparts with limited or no such knowledge. However, it is important for instructors to be able to provide support in a timely manner to avoid frustration and overall lack of interest in the e-learning application.

2.3.4 E-learning Framework

Advances in information technology and new developments in learning science provides opportunities to create well-designed, learner-centered, engaging, interactive, affordable, efficient, easily accessible, flexible, meaningful, distributed, and facilitated e-learning environments. Each stage of the e-learning process requires thoughtful analysis and investigation of how to use the Internet's potential in concert with instructional design principles and issues important to various dimensions of the e-learning environment. The Khan (2001) e-learning framework in figure [4] has eight dimensions: institutional, pedagogical, technological, interface design, evaluation, management, resource support, and ethical and have been discussed as below.



Source: adopted from Khan (2001)

Figure 2.7: E-learning Framework

The **institutional** dimension is concerned with issues of administrative affairs (e.g., organization and change, accreditation, budgeting, and return on investment, information technology services, instructional development and media services, marketing admissions, graduation, and alumni affairs); academic affairs (e.g., faculty and staff support, instructional affairs, workload, class size, compensation, and intellectual property rights); and student services (e.g., pre-enrollment services, course and program information, orientation, advising, counseling, financial aid, registration and payment, library support, bookstore, social support network, tutorial services, internship and employment services, and other services) related to e-learning.

The **pedagogical** dimension of e-learning refers to teaching and learning. This dimension addresses issues concerning goals/objectives, content, design approach, organization, methods and strategies, and medium of e-learning environments. Various e - learning methods and strategies include presentation, demonstration, drill and practice, tutorials, games, storytelling, simulations, role-playing, discussion, interaction, modeling, facilitation, collaboration, debate, field trips, apprenticeship, case studies, generative development, and motivation.

The **technological** dimension of the framework examines issues of technology infrastructure in e-learning environments. This includes infrastructure planning, hardware, and software.

The **interface design** refers to the overall look and feel of e - learning programs. Interface design dimension encompasses page and site design, content design, navigation, and usability testing.

The **evaluation** for e-learning includes both assessment of learners and evaluation of the instruction and learning environment.

The **management** of e-learning refers to the maintenance of learning environment and distribution of information.

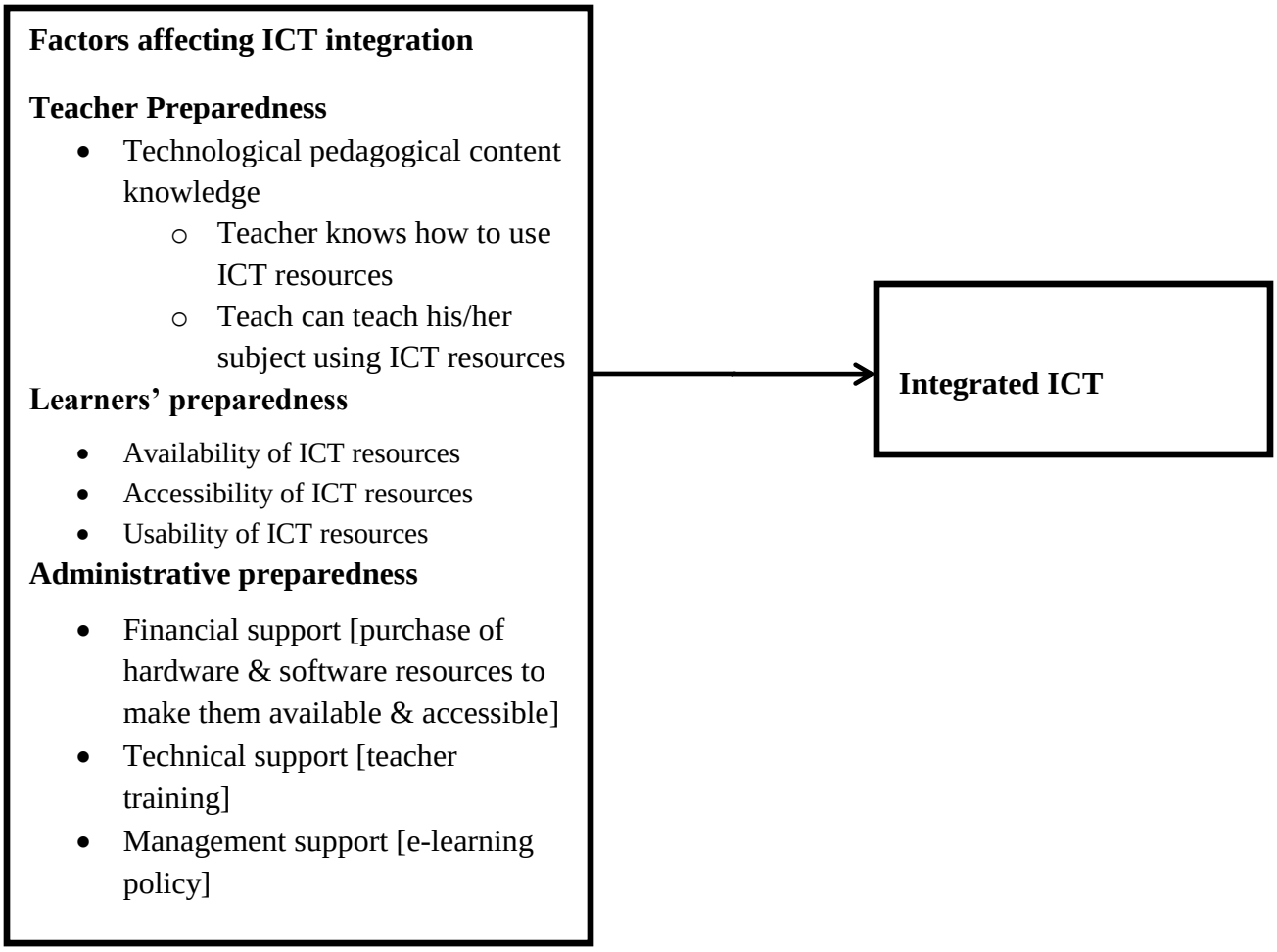
The **resource support** dimension of the framework examines the online support (e.g., instructional/counseling support, technical support, career counseling services, other online support services) and resources (i.e., both online and offline) required to foster meaningful learning environments.

The **ethical** considerations of e-learning relate to social and cultural diversity, bias, geographical diversity, learner diversity, information accessibility, etiquette, and the legal issues (e.g., policy and guidelines, privacy, plagiarism, copyright).

2.3.5 Proposed Conceptual Framework

The use of TPACK Model by Mishra and Koehler (2008) independently in this study is limited because it looks at only the aspect of how teachers can develop and apply technological pedagogical content knowledge (TPACK) in their teaching. It does not look at learners preparedness to embrace e-learning such as Affective (learning) in terms of attention (arousal, curiosity, interest), or confidence (positive expectations, persistence and challenge) thus providing need for e-learning usability framework by Zaharias (2009). However, e-learning usability framework does not address the issue of sustainable learning environment such as organizational priorities like administrative preparedness in terms of e-learning maintenance [i.e. financial support to purchase e-learning resources (hardware & software), technical support such as teacher training, and management support by drafting institutional e-learning policy thus necessitating the use of E-learning Integration Model by Newton and Ellis (2006) and E-learning framework by Khan (2001) to address the above short comings as illustrated in figure [5].

2.4 Conceptual Framework



Source: Adopted from Koehler and Mishra (2008), Zaharias (2009), Newton and Ellis (2006), and Andersson and Grönlund (2009), researcher modified (2019)

Figure 2.8: Proposed Conceptual Framework

2.5 Empirical Studies

A study by Odhiambo (2013) focused on the impact of e-learning on academic performance. The methodology that was employed in this study was systematic random sampling for students under traditional study mode and purposive sampling in identification of students under the e-learning study mode. The study found that in order to improve teaching effectiveness and academic achievement, higher education should consider aiming to develop e-learning teaching strategies that encourage greater engagement and also take into consideration the different learning styles found within the student body.

Onyango et al., (2015) conducted a study to compare the e-learning resources, usage and challenges in instruction and student performance among Primary Schools in Kisumu Municipality and Muhoroni Sub County. A causal comparative research design was used on a population of 104 and 50 pupils, teachers, and head teachers from Kisumu Municipality and Muhoroni Sub County, respectively, on whom three separate questionnaires were used for data collection. Purposive sampling method was used to select 10 Primary Schools from the two regions, where 10 pupils, two teachers and one head-teacher were randomly selected to participate in the study. Hypotheses were used to test statistical difference in resource usage, and challenges, using the t- test at alpha level of significance. Construct and content validity was done to ensure the instruments were adequate and the content required was covered respectively. The findings were that teachers and pupils in Kisumu Municipality had a higher rate of access to ICTs, although this did not contribute to performance in KCPE. Due to the above, the study recommended that appropriate infrastructure be established to support e-learning equipment.

Omariba (2016) conducted a study on teachers' preparedness in integrating ICT in training teachers in public teacher training colleges. A descriptive survey research design was used in the study which was conducted in four (4) public Primary teacher training colleges in Central region of Kenya. The target populations were tutors, second year student teacher trainees, College principals and Kenya Institute of Curriculum Development (KICD) e-learning Officers. The major research instruments were questionnaires for tutors and student teacher trainees, interview schedule for the principals and Kenya Institute of Curriculum Development e-learning developers, and observation schedule. The obtained data were analyzed systematically using descriptive statistics and presented with the help of frequency tables, figures and percentages.

The study findings revealed that the types of ICTs available were inadequate; access to the computers was poor with limited internet connectivity. Adoption of integrating ICT by tutors into their instructional process was not significantly related to their years of teaching experience. Finally, tutors faced several challenges in an attempt to integrate ICTs into the curriculum such as inadequate facilities, lack of competence, knowledge and skills, lack of support from the college administration and the government and lack of ICT policies on integration of ICT.

2.6 Gap in the Literature

A study by Odhiambo (2013) focused on the impact of ICT on academic performance; however, this study will focus on the factors affecting ICT integration in Primary Schools thus closing the content gap. Furthermore, Onyango et al., (2015) conducted a study to compare the e-learning resources, usage and challenges in instruction and student performance among Primary Schools in Kisumu Municipality and Muhoroni Sub County. However, this study is not a comparative study, rather it is an assessment study and it looked at the preparedness of the teachers, administrators, and learners can enable a successful integration of ICT in Primary Schools. Therefore this study hopefully will contribute to the body of knowledge by providing specific factors that are suitable for integrating ICT in the primary school context and building an ICT framework that can be used in a primary school setting across the country.

CHAPTER THREE
METHODOLOGY

3.0 Introduction

This section looked at the research design, study population, sample size, sampling technique, data sources, research instrument, validity and reliability, data collection procedure, data analysis and ethical considerations.

3.1 Research Approach

There are two broad categories of research in terms of approach which include: inductive and deductive approaches. An inductive argument is an argument that is intended by the arguer merely to establish or increase the probability of its conclusion. In an inductive argument, the premises are intended only to be so strong that, if they were true, then it would be unlikely that the conclusion is false. There is no standard term for a successful inductive argument. But its success or strength is a matter of degree. In other words, if the author of the argument does not think that the truth of the premises definitely establishes the truth of the conclusion, but nonetheless believes that their truth provides good reason to believe the conclusion is true, then the argument is inductive (Graziano & Raulin, 2010).

According to Collis and Hussey (2003), induction approach involves gaining an understanding of the meanings humans attach to events. It gives a close understanding of the research context and involves collection of qualitative data. Furthermore, induction approach provides a more flexible structure to permit changes of research emphasis as the research progresses and in most cases the researcher is part of the research process (Collis & Hussey, 2003).

On the other hand, deduction approach as stated by Maylor and Blackmon (2005) involves moving from theory to data and is able to explain causal relationships between variables. Specifically, it involves collection of quantitative data, the application of controls to ensure validity of data and the researcher is independent of what is being researched.

This study used both inductive and deductive approaches. Inductive approach was used to help the research collect data using interviews from the head teachers of the selected schools as to get in-depth knowledge of their preparedness as an administration to integrate ICT in their schools.

On the other hand, deductive approach was used in this study since it emphasizes the use of questionnaires thus quantifiable data will be collected from teachers, learners and head teachers to establish factors that would most likely affect the successful integration of e-learning in schools. In short, given the relevance of both the deduction and induction approaches, this study preferred to adopt both so as to provide a comprehensive conclusion of the findings.

3.2 Research Strategies

There are several research strategies used in social science research among which include experimental, survey, action research, case study, grounded theory, ethnography and archival research (Saunders et al., 2012). Although these strategies are advantageous in their own context and application, the current study prefers to use survey strategy because the survey strategy is usually associated with the deductive approach and it is most frequently used to answer who, what, where, how much and how many questions. Thus it helped the research to answer the question of what factors are affecting ICT integration in primary schools and how will the ICT framework for ICT integration in the Primary Schools in Bundibugyo be designed:

Furthermore, surveys are popular as they allow the collection of a large amount of data from a sizeable population in a highly economical way. Often obtained by using a questionnaire administered to a sample (i.e. teachers, head teachers, and learners), these data are standardized, allowing easy comparison. The survey strategy allows a researcher to collect quantitative data which he/she can analyze quantitatively using descriptive and inferential statistics. In addition, the data collected using a survey strategy can be used to suggest possible reasons for particular relationships between variables and to produce models of these relationships. Thus in the context of this study, the use of survey helped the researcher to find out the factors that are likely able to affect ICT integration in primary schools and informatively adjust the current model to fit the findings from field work.

3.3 Research Design

The study used a cross-sectional research design. Cross-sectional design allows for the study of the population at one specific time and the difference between the individual groups within the population to be compared (Cooper & Schindler, 2003). Best and Khan (2009) argued that cross-sectional research describes and interprets phenomena and is concerned with conditions or

relationships that exists, opinions that are held, processes that are going on, and effects that are evident or trend that are developing. The choice of this research design is justified since the study aims at identifying the general characteristics of Primary Schools in integrating ICT.

3.4 Study Population

The study population was 4,553 participants who included teachers, head teachers, and pupils from 157 Primary Schools in Bundibugyo (Bundibugyo District Education Report, 2018). However, the study using stratification method targeted 12 Schools thus making the target population to be 363 teachers, head teachers, and pupils. On the other hand, one head teacher was selected from each School to participate in an interview.

3.5 Sample Size

The sample size was determined using Krejcie and Morgan (1970) table *see* appendix V. According to Morgan Table, a sample of 363 participants is estimated at 191. Thus the sample size of this study is 191 respondents.

In order to get the right sample size from each School, the researcher used the following formula and multiplied the results to each target population to get the sample from each School.

$$Sampling\ fraction = \frac{191}{363} = 0.526$$

Table 3.1: Quantitative Sample Size

Primary Schools	Target Population		Sample Size		Sampling Technique
	Teachers and head teachers	Learners	Teachers and head teachers	Learners	
School A	19	10	10	5	Simple random
School B	18	10	9	5	Simple random
School C	20	10	11	5	Simple random
School D	21	10	11	5	Simple random
School E	23	10	12	5	Simple random
School F	21	10	11	5	Simple random
School G	17	10	9	5	Simple random
School H	22	10	12	5	Simple random
School I	19	10	10	5	Simple random
School J	20	10	11	5	Simple random
School K	21	10	11	5	Simple random
School L	22	10	12	5	Simple random
Sub Total	**243**	**120**	**129**	**60**	
Overall total	**363**		**189**		

3.6 Sampling Strategy

Stratified random sampling procedure was used for selecting twelve Primary Schools in Bundibugyo. Bundibugyo district was subdivided into five strata and the stratum with the highest number of schools will be selected. Stratified random sampling is used because the researcher wanted to highlight a specific subgroup within the population. This technique is useful in such researches because it ensures the presence of the key subgroup within the sample.

The researcher used classroom register to select pupils in primary six and primary seven from each selected school to participate in the study. The preference of pupils in P.6 and P.7 was due to the fact that they are considered to be able to read and write properly thus they would understand and answer the research questionnaire accordingly. Simple random sampling was used for none biasness. In addition, the researcher selected the teachers using simple random sampling from the teacher register for equal opportunity in participation. On the other hand, purposive sampling was used to select the head teachers due to their in-depth knowledge about the research topic. Neuman (2005) explains that this form of sample is often used when working

with very small samples and when the researcher wishes to select cases that are particularly informative.

3.7 Data Sources

The study used Primary sources of data which was collected from the field using questionnaires and interviews from the teachers and the head teachers.

3.8 Research Instrument

This study used two research instruments, namely; questionnaires, and interviews discussed further in the following sections.

3.8.1 Questionnaires

In this study, a structured questionnaire is designed with specified answers and restriction of respondents' ideas limited. This makes it simpler to analyze considering the use of a standardized analytical tool in analyzing huge sample size in this study (Rogers, et al., 2011). The questionnaire was distributed to teachers, head teachers and learners and the content of the questionnaire included the demographic characteristics of the respondents, teacher, learners, and administrators' preparedness to integrate ICT in their teaching learning environment.

This use of questionnaire was preferred in this study because it is cheap and can cover a wide range of respondents; provides respondents with adequate time to understand the questions asked and provide answers accordingly; a researcher is able to collect data from a wide range of samples from the target population, group or elements under investigation; and questionnaires maximise objectivity since the researcher is dependent on respondent's views/ opinion (Kothari, 2004).

3.8.2 Interviews

This study adopted inflexible interview approach. Inflexible (rigid) interview approach is when the wording and the wording sequence of questions are planned beforehand and they are also asked in a planned manner (Kumar, 2011). The interviewees were the head teachers of the twelve selected Schools. The themes of discussions included: teacher preparedness to integrate e-learning, administrative preparedness to integrate e-learning, and the availability of ICT resources to facilitate integration of e-learning. Their responses were recorded using pen and paper. The researcher preferred to use interview tool because it enables the researcher to

establish rapport with potential participants and therefore gain their cooperation, yields the highest response rates in survey research, and allows the researcher to clarify ambiguous answers and when appropriate, seek follow-up information (Bell & Bryman, 2007).

3.9 Validity and Reliability

3.9.1 Validity

Validity refers to the degree to which a study accurately reflects or assesses the specific concept that the researcher is attempting to measure. In other words, validity is concerned with the study's success at measuring what the researchers set out to measure(Kothari, 2004).In this study, the researcher adopted the content validity approach since the determination is primarily judgmental and intuitive. It can also be determined by using a panel of persons who shall judge how well the measuring instrument meets the standards. The researcher used the judgment and expert opinion of the supervisor regarding the research instruments and his recommendations in that regard was used to amend the content of the research instruments.

3.9.2 Reliability

Reliability relates to the consistency of a measure. It is an important test of measurement. Measuring instruments can only be reliable to the extent in which it produces consistent result (Creswell, 2003). This study adopted the internal consistency approach to determine the reliability of the questionnaires. The study used the Cronbach's alpha test to determine reliability of the research instrument. In this test, the average of all correlations in every combination of split-halves was determined. It is considered most suitable for instruments with more than two responses. According to Field (2005), if the Cronbach's alpha values is equal or more than 0.70, the instrument is considered reliable. In this study, all the items that measured the different constructs had reliability of more than 0.70 these are considered reliable. Table 3.2 gives the summary of reliability.

Table 3.2: Reliability Test

Variables tested	Number of items	Cronbach's Alpha
Teacher preparedness	22	0.81
Learners preparedness	17	0.89
Administrative preparedness	03	0.71

3.10 Data Collection Procedure

An introduction letter was obtained from the School of Computing and Information Technology of Kampala International University (KIU) for the researcher to solicit approval to conduct the study from the twelve selected Primary Schools. The researcher administered the questionnaires himself so as to explain any irregularities properly to the respondents and was able to properly and adequately orient them about the study and why it is being carried out. The respondents were requested to sign the informed consent form. They were also guided on how to fill the questionnaires, and the importance of answering every item of the questionnaire without leaving any part unanswered. The respondents were requested to kindly respond to the questionnaire on time. The researcher retrieved the filled questionnaires within one week. After retrieving them back, he thoroughly checked to ensure that all items are adequately answered by the respondents.

3.11 Data Analysis

After retrieving back the questionnaire and collecting the required data, it was then prepared for analysis by using Statistical Package for Social Scientists (IBM SPSS, version 22.0) software. In this process, the data underwent these processes i.e. data editing which involved checking the filled questionnaires for any omissions or mistakes; then data coding which involved giving each item of the questionnaire or variable a code to be used when imputing the data into the computer, and lastly data entry into the computer for analysis.

Before analyzing data, the researcher checked it for errors by looking for values that fall outside the range of possible values. This was achieved by scanning through the data critically column by column and running frequencies for each of the variables to detect anomalies.

After processing (i.e. editing, coding, entry into the computer, and checking) the collected data, the researcher analyzed it. The analysis was conducted in the following manner: frequency counts and percentage distributions were used to analyze data on the demographic characteristics of the respondents. In addition, frequency, and percentage distribution table were used to determine teachers and administrative preparedness in integrating ICT and availability, accessibility, and usability of ICT resources.

Qualitative data analysis

Qualitative data was analyzed using manual coding on the transcripts to identify the significant statements across individual interviews. Subsequent readings of the significant statements helped in identifying meaning of units or sub-themes emerging within the patterns. For presentation of thematic findings, both *textural* and *structural* descriptions was used in the results section. Textural descriptions are significant statements used to write what the participants experienced. Structural descriptions are the interpretation of the context or setting that influenced participants' experiences. For textural descriptions, the quotes of participants was given in italics. The structural descriptions was interpreted by the researcher and was provided in plain text.

3.12 Ethical Consideration

Ethics is about values, priorities, and morals. It gives direction and guidance to what should be done on the basis of obligation and responsibility (Neuman, 2006). In this study, permission for conducting the research was obtained from the School of Computing and Information Technology. In addition to that, confidentiality and anonymity was ensured by not having to write the names of the respondents in any part of the final report publication. Neuman (2006) points out that the rights of subjects need to be protected or the statutory rights of members of the social community or groups being investigated, avoiding undue intrusion, obtaining informed consent, and protecting the rights to privacy of individuals and social groups. This study upheld Neumans' views on protecting the rights of the population targeted. Another ethical issue that was considered is the integrity of the researcher. According to Pettigrew (2001), there are five elements a researcher must follow to do faithful and thorough work. These are accuracy in data collection and processing, use of appropriate research methodology, appropriate interpretation of the data, accurate reporting, and non-fabrication of data and or criminal misconduct. Therefore, the researcher did his best to adhere to these principles.

CHAPTER FOUR
DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

4.0 Introduction

This chapter presents data, analyses them and provides the interpretations thereof. The chapter starts with the demographic characteristics of the respondents. The chapter further captures the findings in each objective of the study.

4.1 Demographic Characteristics of the Respondents

This section captures the demographic characteristics of the respondents in terms of gender, age, and education level for the learners, and gender, age, education level, and work experience for the teachers. Tables 4.1 and 4.2 give the summary of the findings for the learner and teachers respectively.

Table 4.1: Demographic Characteristics of the Learners

Gender		**Frequency**	**Percent (%)**
Valid	Male	39	65.0
	Female	21	35.0
	Total	**60**	**100.0**
Age			
Valid	10-12	00	00.0
	13-14	39	65.0
	15 years and above	21	35.0
	Total	**60**	**100.0**
Education Level			
Valid	P.6	31	51.6
	P.7	29	48.4
	Total	**60**	**100.0**

Source: Primary data, 2021

The results presented in Table 4.1 shows that majority, (65%) of the respondents were male, while (35%) were female. This implies that boys are more than girls in the surveyed primary schools in Bundibugyo district. This calls for more emphasis on girl child education and fight against early marriage.

Furthermore, Table 4.1 shows that majority (65%) of the respondents were within the age group of 13-14 years, while those 15 years of age were represented by (35%). This implies that the boys and girls that participated in this study were mature enough to provide independent, informed and trustable responses.

Lastly, Table 4.1 shows that majority (51.6%) of the respondents were in primary six while (48.6%) were in primary seven. This implies that there are more pupils in primary six than primary seven because of primary seven entry exams that helps to promote only the best performing pupils to P.7.

Table 4.2: Demographic Characteristics of the Teachers

Gender		**Frequency**	**Percent (%)**
	Male	72	55.8
	Female	57	44.2
	Total	**129**	**100.0**
Age			
	20-29	12	11.6
	30-39	49	38.0
	40-49	45	34.9
	50 and Above	23	17.8
	Total	**129**	**100.0**
Education Level			
	PTC Certificate	75	58.1
	Diploma	40	31.0
	Bachelor Degree	14	10.9
	Post Graduate Diploma	0	0.0
	Master's Degree	0	0.0
	Total	**129**	**100.0**
Work Experience			
	1-5	10	7.8
	5-10	23	17.8
	More than 10	96	74.4
	Total	**129**	**100.0**

Source: Primary data, 2021

The findings in Table 4.2 shows that majority, (55.8%) of the respondents were male, while (44.2%) were female. This implies that there are more male teachers in the primary schools in Bundibugyo district than female teachers. This could be because female students find it difficult to continue with their education due to challenges that face the girl child such as early marriage, parents' preference for the boy child, and lack of sanitary facilities among others.

Furthermore, Table 4.2 shows that majority, (38%) of the respondents were within the age group of 30-39 years, followed by (34.9%) who were within the age group of 40-49 years old, while those within 20-29 years and 50 and above were represented by 9.3% and 17.8% respectively.

In addition, Table 4.2 shows that majority, (58.1%) of the respondents were PTC Certificate Holders, followed by (31%) who were Diploma Holders, and (10.9%) who were Bachelor Degree Holders. None of the respondents had Postgraduate Diploma or Masters Qualification. This implies that most of the teachers in the surveyed primary schools in Bundibugyo district have not yet taken upgrading to higher education level seriously.

Lastly, Table 4.2 shows that majority, (74.4%) of the respondents had work experience of more than 10 years, followed by (17.8%) who had work experience of 5-10 years, and (7.8%) who had work experience of 1-5 years. The dominance of the respondents with more than 10 years work experience implies that the teachers in the surveyed primary schools in Bundibugyo district are exposed and knowledgeable enough to provide the right educational content to their pupils.

4.2 The Factors Affecting ICT Integration Situation in the Primary Schools in Bundibugyo.

Objective one findings: the first objective of this study was to investigate the factors affecting ICT integration situation in the Primary Schools in Bundibugyo. This section captures the findings of the factors to include teacher preparedness, learners' preparedness to use integrated e-learning, and administrative preparedness to support ICT integration.

4.2.1 Teacher Preparedness to Use E-Learning

This section captures information regarding teachers' preparedness to use integrated e-learning in terms of technological pedagogical content knowledge, availability of ICT resources, accessibility of ICT resources, and user-ability of ICT resources. The following tables give the summary of the findings.

Table 4.3: Teacher Preparedness to use Integrated ELearning

		Frequency	Percent (%)	Mean	Standard deviation (Std)
I can teach my subjects easily using a projector					
	Strongly disagree	110	85.3	1.22	0.640
	Disagree	14	10.9		
	Agree	00	0.0		
	Strongly agree	5	3.9		
	Total	**129**	**100.0**		
I can easily teach students how to prepare a PowerPoint presentation					
	Strongly disagree	112	86.8	1.17	0.470
	Disagree	12	9.3		
	Agree	5	3.9		
	Strongly agree	0	0.0		
	Total	**129**	**100.0**		
I can easily teach students how to search internet resources to get updated information about my subject area					
	Strongly disagree	116	89.9	1.16	0.522
	Disagree	8	6.2		
	Agree	3	2.3		
	Strongly agree	2	1.6		
	Total	**129**	**100.0**		
I can teach students how to use a computer to solve academic problem (e.g. mathematics, geography maps etc.)					
Valid	Strongly disagree	114	88.4	1.17	0.532
	Disagree	10	7.8		
	Agree	3	2.3		
	Strongly agree	2	1.6		
	Total	**129**	**100.0**		
I can easily use a whiteboard during my teachings					
	Strongly disagree	113	87.6	1.17	0.486
	Disagree	10	7.8		
	Agree	6	4.7		
	Strongly agree	0	0.0		
	Total	**129**	**100.0**		

Source: primary data, 2021

Table 4.3 shows that majority, (85.3%) of the respondents strongly disagreed that they can teach their subjects easily using a projector (mean = 1.22, Std =0.640). This implies that the teachers in

the surveyed primary schools do not have the knowledge and the competence to use a projector when teaching. In addition, (86.8%) of the respondents strongly disagreed that they can easily teach students how to prepare a PowerPoint presentation (mean = 1.17, Std = 0.470). This implies the teachers lack Microsoft Office skills and exposure hence not able to give what they do not have. Likewise, (89.9%) of the respondents strongly disagreed that they can easily teach students how to search internet resources to get updated information about their subject area (mean = 1.16, Std = 0.522). This implies that teachers lack internet usage and hence cannot search updated information to teach students neither do they know how to teach internet usage to their pupils. Additionally, (88.4%) of the respondents strongly disagreed that they can teach students how to use a computer to solve academic problem (e.g. mathematics, geography maps etc.) (mean = 1.17, Std = 0.532). Lastly, (87.6%) of the respondents strongly disagreed that they can easily use a whiteboard during their teachings (mean = 1.17, Std = 0.486).

On the other hand, the researcher in a qualitative survey asked the head teachers on how much the teachers were prepared to use integrated e-learning in their teaching activities, their responses were summarized as below.

> Teachers are not prepared as they are not equipped with skills on the usage of e-learning (KII, 001).
>
> No level of teacher preparation to measure because none of the staff is trained on e-learning and its integration (KII, 002).
>
> Teachers don't have knowledge of ICT to integrate e-learning in the schools (KII, 003).
>
> Teachers are not prepared in the integration of e-learning in this school because there is none who is trained in ICT knowledge (KII, 004).
>
> Teachers are not prepared at all in the integration of e-learning due to lack of training in ICT (KII, 005).

Generally, both quantitative and qualitative data confirm that the teachers in the surveyed primary schools lack the technological pedagogical content knowledge in which they cannot use a projector, whiteboard, internet, or a computer. This implies that e-learning is impossible when the implementers (teachers) lack knowledge on computer and internet usage.

4.2.1.1 Availability of ICT Resources

The section captures information regarding teachers' preparedness to use integrated eLearning in terms of availability of ICT resources such as computers, internet connection, projector, website etc., Table 4.4 gives the summary of the findings.

Table 4.4: Availability of ICT Resources

	Frequency	Percent (%)	Mean	Standard Deviation (Std)
How do you agree or disagree on the availability of the following ICT resources in your schools				
Computers in classroom				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	129	100.0		
Internet connection				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	129	100.0		
Projector				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	129	100.0		
Website				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	129	100.0		
Email				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	129	100.0		
Computer lab				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	129	100.0		
Whiteboard				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		

Not available	129	100.0		

Source: primary data, 2021

The results presented in table 4.4 shows that all the respondents indicated that none of the following ICT resources are available in their schools: computers in classroom, internet connection, projector, website, email, computer laboratory, and whiteboards. This implies that lack of these ICT resources makes it impossible to integrate eLearning, thus ICT resources must be implemented first before integration can take place.

Furthermore, the researcher in qualitative survey asked key interview informants (the head teachers) of how available are ICT facilities in their primary school to enable successful integration of e-learning, and their responses were summarized as below:

> All government aided primary schools don't have ICT facilities (KII, 001).
>
> Nothing is available as a facility on ICT (KII, 002).
>
> No ICT facilities are available in this school (KII, 003).
>
> There is no ICT facilities in this primary school to enable successful integration of e-learning (KII, 004).

The above quantitative and qualitative responses confirm that indeed the surveyed primary schools in Bundibugyo district do not have ICT resources and thus the teachers are not prepared to use integrated eLearning.

4.2.1.2 Accessibility of ICT Resources

This section captures information regarding how often teachers access ICT resources in the classrooms, computer laboratories, libraries, and school compounds. Table 4.5 gives the summary of the findings.

Table 4.5: Accessibility of ICT Resources

	Frequency	Percent (%)	Mean	Standard Deviation (Std)
How often do teachers access ICT resources in the following locations in your school?				
Classroom				
Never	129	100.0	1.00	0.000
Sometimes	0	0.0		
Always	0	0.0		
Computer Lab				
Never	129	100.0	1.00	0.000
Sometimes	0	0.0		
Always	0	0.0		
Library				
Never	129	100.0	1.00	0.000
Sometimes	0	0.0		
Always	0	0.0		
School compound				
Never	129	100.0	1.00	0.000
Sometimes	0	0.0		
Always	0	0.0		

Source: primary data, 2021

The results presented in table 4.5 shows that teachers cannot access ICT resources in the classrooms, computer laboratories, libraries, and school compounds in the schools they teach in. This is obvious because even the ICT resources in question are not available in the first place, thus impossible to access.

4.2.1.2 Usability of ICT Resources

This section captures information regarding the usability of ICT resources in the surveyed primary schools in Bundibugyo district. Table 4.6 gives the summary of the findings.

Table 4.6: Usability of ICT Resources

	Frequency	Percent (%)	Mean	Standard Deviation (Std)
How usable are the following ICT resources at your School?				
Computers				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	129	100.0		
Projector				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	129	100.0		
Whiteboard				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	129	100.0		
Internet				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	129	100.0		
Computer lab				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	129	100.0		
Software packages [e.g. Microsoft Office]				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	129	100.0		

Source: primary data, 2021

The results presented in Table 4.6 shows that all the respondents indicated that the following ICT resources are not usable in their primary schools: computers, projectors, whiteboards, internet/email, computer labs, software packages [e.g. Microsoft Office]. Thus the question is, why are they not usable, because they are not accessible, and why are they not accessible, because they are not available. The implication is, lack of teacher preparedness and subsequent failure to integrate eLearning at primary school level.

Table 4.7: Summary on ICT Resources

ICT Resources	Availability	Accessibility	Usability	Teacher preparedness to use
Computers	No	No	No	No
Projector	No	No	No	No
Whiteboard	No	No	No	No
Internet	No	No	No	No
Website	No	No	No	No
Computer Lab	No	No	No	No
Software packages [e.g. Microsoft Office]	No	No	No	No

Table 4.7 gives the summary of ICT resources in terms of availability, accessibility, and usability. The table shows that these ICT resources are not available, not accessible, and not usable thus affecting teachers' preparedness to integrate eLearning; computers, projector, whiteboard, internet, website, computer Lab, and software packages [e.g. Microsoft Office].

4.2.2 Learners Preparedness to Integrated ICT in their learning processes

This section captures the level at which learners are prepared to embrace ICT Integration in their learning adventure. Table 4.8 gives the summary of the findings.

Table 4.8: Availability of ICT Resources

	Frequency	Percent (%)	Mean	Standard Deviation (Std)
How do you agree or disagree on the availability of the following ICT resources in your schools				
Computers in classroom				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	60	100.0		
Internet connection				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	60	100.0		
Projector				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	60	100.0		
Website				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	60	100.0		
Email				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	60	100.0		
Computer lab				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	60	100.0		
Whiteboard				
Available	0	0.0	1.00	0.000
Fairly available	0	0.0		
Not available	60	100.0		

Source: primary data, 2021

The results presented in table 4.8 shows that all the respondents indicated that none of the following ICT resources are available in their schools: computers in classroom, internet connection, projector, website, email, computer laboratory, and whiteboards. This implies that

lack of these ICT resources makes it impossible for pupils to integrate ICT in their learning escapade.

Table 4.9: Accessibility of ICT Resources

	Frequency	Percent (%)	Mean	Standard Deviation (Std)
How often do teachers access ICT resources in the following locations in your school?				
Classroom				
Never	60	100.0	1.00	0.000
Sometimes	0	0.0		
Always	0	0.0		
Computer Lab				
Never	60	100.0	1.00	0.000
Sometimes	0	0.0		
Always	0	0.0		
Library				
Never	60	100.0	1.00	0.000
Sometimes	0	0.0		
Always	0	0.0		
School compound				
Never	60	100.0	1.00	0.000
Sometimes	0	0.0		
Always	0	0.0		

Source: primary data, 2021

The results presented in table 4.9 shows that pupils cannot access ICT resources in the classrooms, computer laboratories, libraries, and school compounds of their schools. This implies that if ICT resources are not accessible to the pupils then it cannot be implemented, leave alone receiving integrated eLearning.

Table 4.10: Usability of ICT Resources

	Frequency	Percent (%)	Mean	Standard Deviation (Std)
How usable are the following ICT resources at your School?				
Computers				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	60	100.0		
Projector				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	60	100.0		
Whiteboard				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	60	100.0		
Internet				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	60	100.0		
Computer lab				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	60	100.0		
Software packages [e.g. Microsoft Office]				
Usable	0	0.0	1.00	0.000
Fairly usable	0	0.0		
Not usable	60	100.0		

Source: primary data, 2021

The results presented in Table 4.10 shows that all the respondents indicated that the following ICT resources are not usable in their primary schools: computers, projectors, whiteboards, internet/email, computer labs, software packages [e.g. Microsoft Office]. All these narrows down to the fact that ICT resources are not accessible neither are they available. This therefore answers the question that says "what are the factors affecting ICT integration situation in the Primary

Schools in Bundibugyo?" The answer is, teachers and pupils lack the preparedness to integrate ICT because of lack of available ICT resources, Inaccessibility of ICT resources, and lack of usable ICT resources.

4.2.1.3 Administrative Preparedness to Support Integrated E-Learning

This section captures information regarding technical support [e.g. offering ICT training opportunities for teachers], financial support [e.g. buying ICT resources like computers, projectors etc.], and managerial support [e.g. head teacher encouraging teachers to often use computer during class lessons]. Table 4.11 gives the summary of the findings.

Table 4.11: Administrative Preparedness to Support Integrated E-Learning

	Frequency	Percent (%)	Mean	Standard deviation
Technical support [e.g. offering ICT training opportunities for teachers]				
Strongly disagree	129	100.0	1.00	0.000
Disagree	0	0.0		
Agree	0	0.0		
Strongly agree	0	0.0		
Total	**129**	**100.0**		
Financial support [e.g. buying ICT resources like computers, projectors etc.]				
Strongly disagree	129	100.0	1.00	0.000
Disagree	0	0.0		
Agree	0	0.0		
Strongly agree	0	0.0		
Total	**129**	**100.0**		
Managerial support [e.g. head teacher encouraging teachers to often use computer during class lessons]				
Strongly disagree	129	100.0	1.00	0.000
Disagree	0	0.0		
Agree	0	0.0		
Strongly agree	0	0.0		
Total	**129**	**100.0**		

Source: primary data, 2021

The results presented in table 4.11 shows that administrative preparedness to support ICT Integration in the surveyed primary schools is still not possible. This is because majority, (100%) of the respondents strongly disagreed that they are prepared to provide technical support to promote ICT integration. This implies that the head teachers and PTA members do not provide teachers with the opportunities of ICT training. In addition, (100%) of the respondents strongly disagreed that they are prepared to financially support ICT integration. This implies that the head teachers do not have budget for purchasing computers or installing internet or hiring a technical expert in ICT. Lastly, (100%) of the respondents strongly disagreed that they are prepared to managerially support integration of ICT in teaching and learning. This implies that the head teachers do not encourage teachers to often use computer during class lessons. Although the teachers cannot use what is not available or what they themselves are not trained to use.

In a qualitative survey, the head teachers were asked this question "how are administrators like you supportive in the integration of e-learning in this Primary School in terms of financial support, technical support and managerial support?" Their responses were summarized as below.

> In regard to support by administrators, the approval is very expensive since especially when it comes to purchase of ICT equipment (KII, 001).
>
> No support in any way at all since the programme is not available in primary schools (KII, 002).
>
> It is difficult to support something which is not available in the school (KII, 003).
>
> As an administrator, I don't financially support the programme neither technically or managerial because it is not carried out in this primary school (KII, 004).
>
> There is no support being offered by the school administration since there is no one among the staff who is trained on ICT and integration of e-learning (KII, 005).

The above responses is an indicator that there is no administrative support for a venture that is of none existence in the first place.

The researcher further enquired of what challenges are available in making eLearning integration a possibility at primary schools. The responses of head teachers were summarized as below.

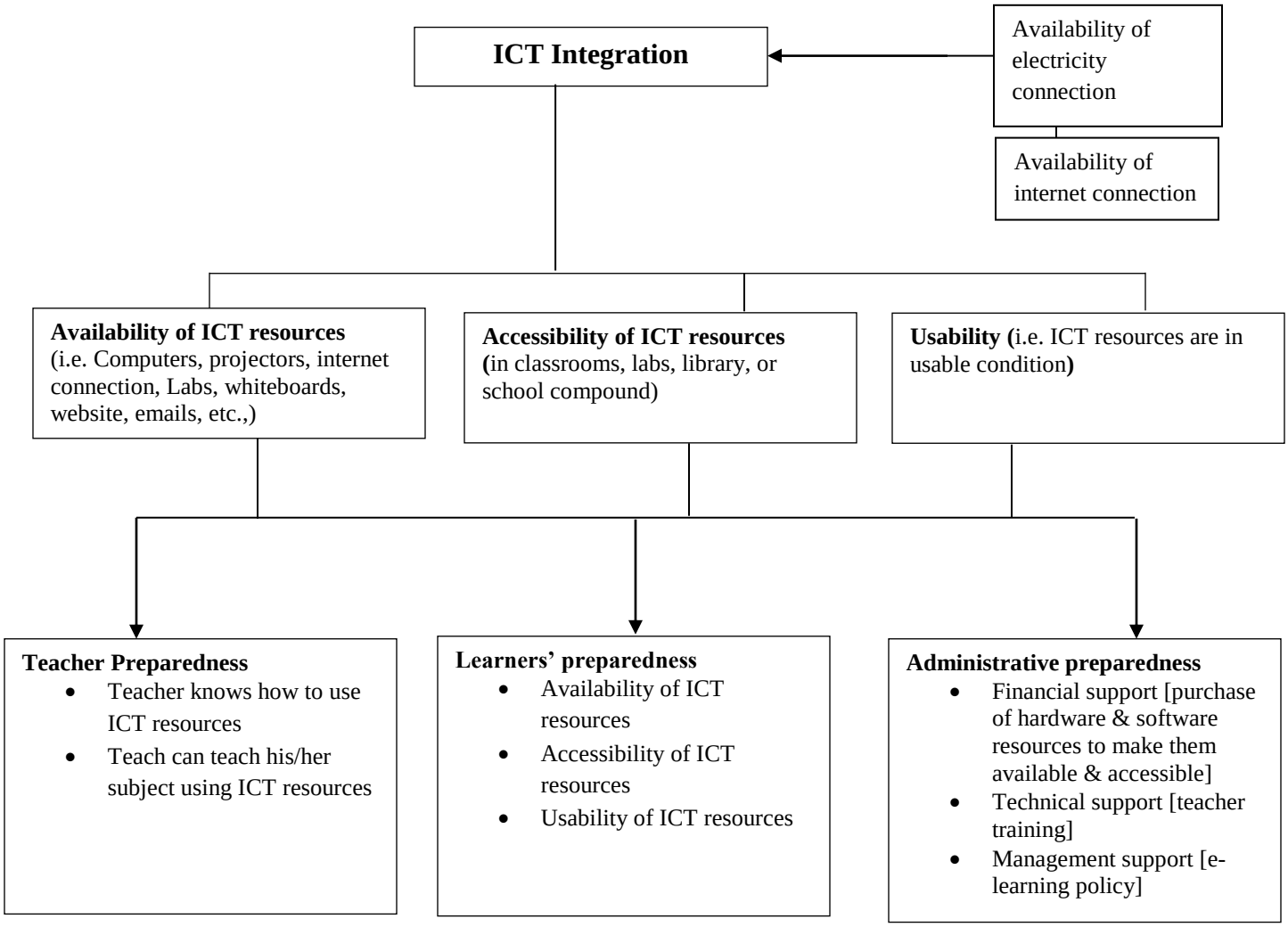
> Teachers lack technical skills on the use of ICT equipment to boost e-learning. There is lack of government intervention to equip government aided primary schools with ICT equipment. The curriculum does not cater for e-learning approach on the use of ICT equipment. It does not support rural learners who do not have access to electricity (KII, 001).
>
> No challenges as yet since e-learning is not in place at primary school level (KII, 002).
>
> Teachers are not trained in ICT knowledge. ICT facilities are not in Place. The school does not have any source of electricity. There is no ICT laboratory (KII, 003).
>
> Teachers are not trained in ICT knowledge. The government does not consider ICT on the primary school curriculum. The school is not connected to any source of electricity. Even if we receive a donation of ICT facilities, the school has no ICT lab where to install them. Most schools in the district have not yet reached the level of using modern technology (KII, 004).

Thus given the situation on ground, the researcher asked the head teachers of what solutions can be preferred to stimulate the use of integrated eLearning at primary school level. Their responses were summarized as below.

> Teachers need to be trained on use of ICT. The National curriculum development centre (NCDC) should ensure that the approach is incorporated in the curriculum. It should be holistic, i.e. cater for all learners in all spheres. Government should provide ICT equipment in all government aided primary schools (KII, 001).
>
> Training of primary school staff on ICT usage. Installation of power sources in primary schools. Installation of ICT facilities for use (KII, 002).
>
> The government should train teachers in ICT knowledge. The government should provide ICT facilities in schools. The government should make available or provide sources of electricity to schools such as solar or generators. Government should construct ICT labs in schools (KII, 003).
>
> Teachers should be encouraged to train further in ICT knowledge since there is a computercourse at every level of their profession in terms of education. The government should consider incoporating ICT studies on the primary school curriculum (KII, 004).
>
> Governent should construct ICT labs in primary schools atleast two in each subcounty and fully stock them so that other schools can always go there for skills (KII, 005).

4.3 A Design of A Framework For ICT Integration in The Primary Schools in Bundibugyo

Objective two findings: the second objective of this study was to design a framework for ICT integration in the Primary Schools in Bundibugyo.



Source: Researcher designed (2021)

Figure 4.1: Developed Framework for ICT integration for primary school in Bundibugyo district

4.4 Validation of the Framework for ICT integration in the Primary Schools in Bundibugyo District

Objective three findings: the third objective of this study was to validate the framework for integrating ICT in the Primary Schools in Bundibugyo District. Table below shows the validation criteria.

Table 4.12: Validation of ICT Integration Framework

ICT resources	**Yes (%)**	**No (%)**	**Mean**	**Standard deviation (Std)**
Availability of ICT resources enables integrated e-learning	122 (95)	7 (5)	1.95	0.227
Accessibility of ICT resources enables integrated e-learning	109 (84)	20 (16)	1.84	0.363
Usability of ICT resources enables integrated e-learning	111 (86)	18 (14)	1.86	0.348
Availability of electricity connection enables integrated e-learning	98 (76)	31 (24)	1.76	0.429
Availability of internet connection enables integrated e-learning	114 (88)	15 (12)	1.88	0.322
Teacher preparedness	**Yes**	**No**		
Teacher training in ICT enable integrated e-learning	123 (95)	6 (5)	1.95	0.211
Teachers' ability to teach using a projector enable integrated e-learning	120 (93)	9 (7)	1.93	0.256
Teachers' ability to teach students how to prepare a PowerPoint presentation enable integrated e-learning	107 (83)	12 (17)	1.83	0.378
Teachers' ability to use internet enable integrated e-learning	112 (87)	17 (13)	1.87	0.340
Teachers' competence in using ICT enable integrated e-learning	99 (77)	30 (23)	1.77	0.424
Teachers' ability to teach using whiteboard enable integrated e-learning	108 (84)	21 (16)	1.84	0.371

Learners preparedness	**Yes**	**No**		
Learner's interest in using ICT resources enable integrated e-learning	110 (85)	19 (15)	1.85	0.356
Learner's curiosity to use ICT resources enable integrated e-learning	88 (68)	41 (32)	1.68	0.467
Learner's motivation to use ICT resources enable integrated e-learning	79 (61)	50 (39)	1.61	0.489
Learner's familiarity with ICT resources enable integrated e-learning	92 (71)	37 (29)	1.71	0.454
Learner's confidence in using ICT resources enable integrated e-learning	96 (74)	33 (26)	1.74	0.438
Administrative preparedness	**Yes**	**No**		
ICT training opportunities for teachers enable integrated e-learning	105 (81)	24 (19)	1.81	0.391
Buying ICT resources enable integrated e-learning	117 (91)	12 (9)	1.91	0.292
Employing ICT technician enable integrated e-learning	102 (79)	27 (21)	1.79	0.408
Encouraging teachers to use ICT resources when teaching enable integrated e-learning.	121 (94)	8 (6)	1.94	0.242

In regard to *ICT resources*, Table 4.12 shows that majority (95%) of the respondents agreed that availability of ICT resources enables ICT integration in the learning/teaching process, (84%) agreed that accessibility of ICT resources enables ICT integration in the learning/teaching process, (86%) agreed that usability of ICT resources enables ICT integration in the learning/teaching process, (76%) agreed that availability of electricity connection enables ICT integration in the learning/teaching process (76%), while 88% of the respondents agreeed that availability of internet connection enables ICT integration in the learning/teaching process.

In regard to *teacher preparedness*, majority (95%) of the respondents agreed that teacher training in ICT enables ICT integration in the learning/teaching process, 93% agreed that teachers' ability to teach using a projector enables ICT integration in the learning/teaching process, 83% agreed

that teachers' ability to teach students how to prepare a PowerPoint presentation enables ICT integration in the learning/teaching process, 87% agreed that teachers' ability to use internet enables ICT integration in the learning/teaching process, 77% agreed that teachers' competence in using ICT enables ICT integration in the learning/teaching process, while 84% of the respondents agreed that teachers' ability to teach using whiteboard enables ICT integration in the learning/teaching process.

In regard to *learners preparedness*, majority (85%) of the respondents agreed that learner's interest in using ICT resources enables ICT integration in the learning/teaching process, 68% agreed that learner's curiosity to use ICT resources enables ICT integration in the learning/teaching process, 61% agreed that learner's motivation to use ICT resources enables ICT integration in the learning/teaching process, 71% agreed that learner's familiarity with ICT resources enables ICT integration in the learning/teaching process, and 74% agreed that learner's confidence in using ICT resources enables ICT integration.

In regard to *administrative preparedness,* majority (81%) of the respondents agreed that ICT training opportunities for teachers enable integration of ICT, 91% agreed that buying ICT resources enable integration of ICT in learning, 79% agreed that employing ICT technician enables ICT integration in the learning/teaching process, and 94% agreed that encouraging teachers to use ICT resources when teaching enable ICT integration.

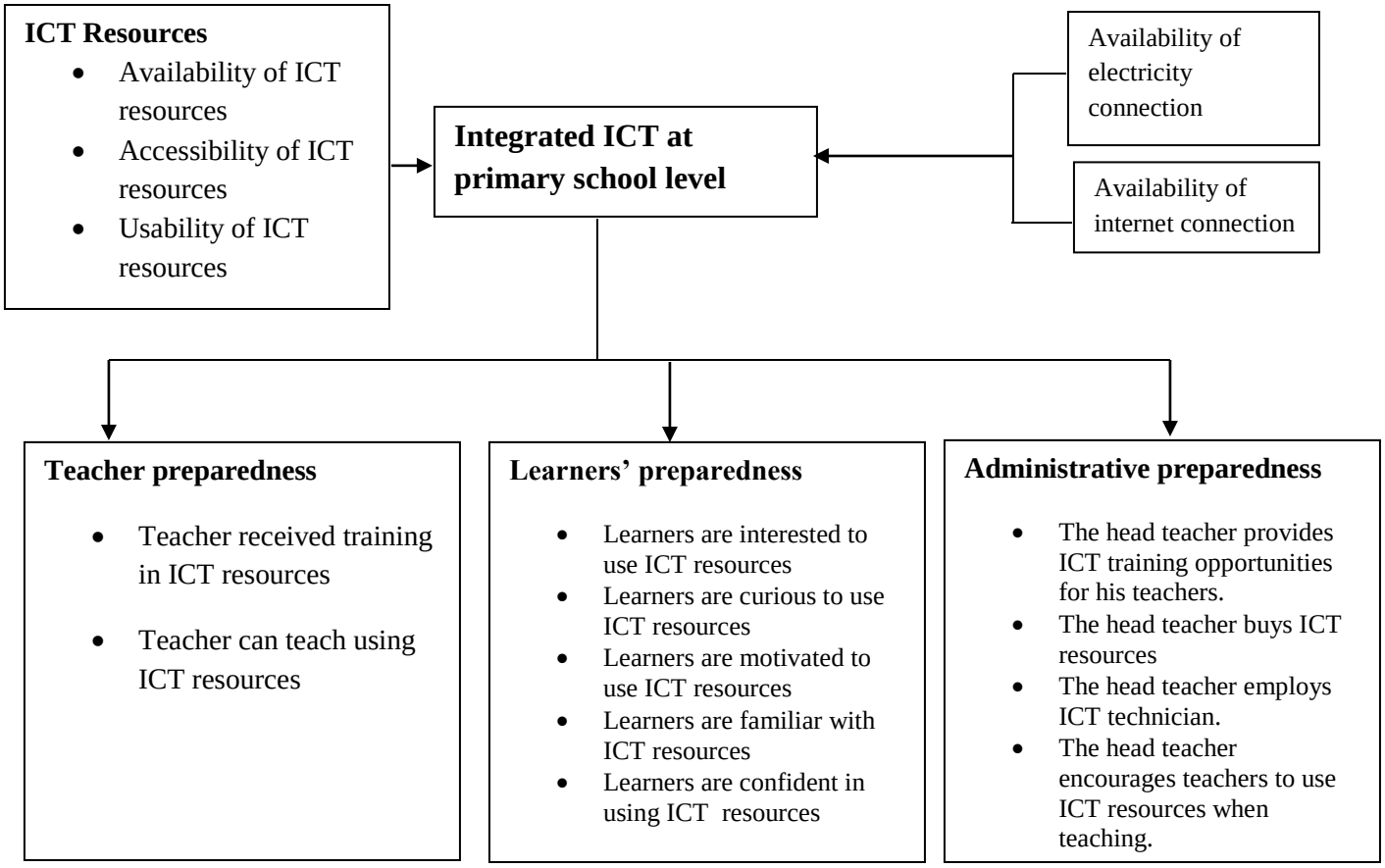


Figure 4.2: Validated Framework for Integrating ICT at Primary School Level

CHAPTER FIVE
DISCUSSIONS, CONCLUSION, AND RECOMMENDATIONS

5.0 Introduction

This chapter provides the discussions of major findings, conclusions and recommendations thereof. The chapter also provides for the suggested new framework that fits the integration of eLearning at primary school level.

5.1 Discussion of Findings

5.1.1 Teachers' Preparedness

The first objective of this study was to investigate the factors affecting ICT integration situation in the Primary Schools in Bundibugyo. The study found that the following factors are affecting ICT integration at primary schools; the level of teacher preparedness, learners' preparedness to use integrated ICT, and administrative preparedness to support integrated ICT. For instance, the study found that teachers were not prepared to use integrated ICT because they are unskilled in using ICT resources. Similarly, the teachers were not prepared to use integrated ICT because ICT resources are not available, accessible, or usable in their schools. It is true that effective integration of ICT for efficiency in instruction depends on the teacher's preparedness especially competency in using the equipments and infrastructures especially electric power. Thus teachers' preparedness requires high competency on digital technology skills which are acquired through training. Inadequate knowledge or lack of it on digital technology delays the progress to the realization of digital-related objectives. Indeed, with well-trained teachers on digital technology skills, the classroom delivery can be very effective and in realizing the education needs of learners. Therefore, teachers' knowledge of digital skills and pedagogy influence directly or indirectly on digital learning integration success in the classroom.

This study is in agreement with several other studies such as that of Omariba (2016), Tsindoli and Opati (2018), Isaboke (2018), Kiugu (2020), and Omariba (2020). For example, Omariba (2016) who conducted a study on teachers' preparedness in integrating ICT in training teachers in public teacher training colleges and found lack of computers, limited access to internet, lack of support from administrators, and lack of competence and skills hindered teachers' preparedness

to use integrated ICT in learning. Furthermore, Tsindoli and Opati (2018) conducted a study to assess teacher preparedness for the implementation of eLearning programmes in Emuhaya Sub-county in Kenya. The findings of the study revealed that teachers were not well prepared to implement e-learning programme therefore a lot of resistance to the programme.

Similarly, Isaboke (2018) investigated teacher preparedness for the integration of ICT in teaching lower primary school pupils in Borabu sub-county, Kenya. The findings revealed that teachers had positive attitudes towards use of ICT but were not ready to use them due to lack of appropriate skills and knowledge. Furthermore, Kiugu (2020) conducted a study that looked into the integration preparedness on implementation of Digital Learning Integration programme in public primary schools in Meru County, Kenya. The findings revealed that majority of teachers were not trained and those trained were ill prepared and resources such as tablets, internet connectivity, computer laboratory and electricity were noted to be inadequate. Last but not least, Omariba (2020) conducted a study with perspectives of student teacher trainees' preparedness and adoption on integration of ICTs in public teacher training colleges. The findings of the study revealed that the training was only offering pedagogy, content, knowledge but not the technology which make integration a reality in the classroom setting.

5.1.2 Learners' Preparedness to use ICT in Learning

The study also found out that the pupils did not know how to use - ICT in Learning because there are no ICT resources such as computers, internet connections, computer laboratories, or projectors. Furthermore, the teachers who should teach the pupils how to use integrated ICT also do not have the ICT skills. However, learners' access to integrated eLearning would ensure equal opportunities for quality learning outcomes. In contrast, lack of exposing young children early in using ICT facilities for interaction and learning would adversely impact their participation in knowledge sharing in later years of schooling and employability opportunities.

This study is in agreement with that of Bitner and Bitner (2002), and Al-Ammari& Hamad (2009). For example, Bitner and Bitner (2002) found that once students develop skills, they could begin to find ways to integrate technology into the learning process and demonstrate its use to others. In addition, Al-Ammari& Hamad (2009) found that students need to be confident in basic ICT literacy so that they can effectively integrate ICT into learning activities. Odhimabo

(2013) found that students are often more engaged and motivated to learn when using relevant ICT to support specific intentional learning.

5.1.3 Administrative Preparedness

The study revealed that there was no administrative support towards integrated ICT technically, financially, or managerially. For instance, in a qualitative survey, the head teachers who were the key informants indicated that there was no financial budget provided by the government for ICT in their primary schools hence making it impossible for them to support it in anyway. Again because the head teachers lack the financial capacity to purchase ICT equipment for integrated eLearning purposes, it makes them unable to encourage the unskilled teachers to teach using integrated eLearning platform. And yet administrators in school, such as the head teachers act as mediators to integrate ICT into the educational system by playing a key role in encouraging, supporting, and helping the teachers to use computers in their teaching-learning process. It is true that the support of the school head teachers can encourage and promote teachers' willingness to use the computer as a medium to deliver instruction. Thus, the role of the school administrator is crucial in providing the force, support and conditions to enhance the use of integrated eLearning in the teaching profession. However, it should also be noted that lack of training support by administrators could be identified as a significant barrier towards the use of integrated eLearning in classrooms. For instance, a study by Krysa (1998) reported that successful implementation of computers could only occur if administrators offer teachers support and leadership.

Therefore, the findings of this study is in agreement with the following studies: Sife et al., (2003), Tusubira and Mulira (2004), Kariuki (2004), Ariho (2011), Hsin-Kai et al., (2007), Akankwasa (2008), and Munyantware (2006). For example, Sife et al., (2003) stated that for the integration of ICTs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, pedagogical, administrative, financial, and social dimensions of ICTs in education. Tusubira and Mulira (2004) also found that for any institution to adapt to new innovations there must be a backup from administrators. Likewise, Priscilla et al., (2008) found that the success of integrating ICT into the teaching-learning interaction among school teachers depends on the support provided by the principal of the school.

Similarly, Sife et al., (2007) established lack of administrative, technical and financial preparedness as problems that prevent teachers from using computers in their teaching. Furthermore, Kariuki (2004) found that teachers use computers more often for their teaching-learning process if they perceived an adequate support from the school administration. Additionally, Ariho (2011) found that teachers who receive adequate ICT support from the administrators are more likely to use ICTs in their teaching practice while those who do not receive ICT support from the higher authorities in School are less enthusiastic in using computer or do not integrate technology at all. Moreover, Hsin-Kai et al., (2007) in a study, found that although many teachers shared beliefs that educational technology could promote learning and that the use of technology is desirable, they were reluctant to use computers (ICT) because of insufficient support and resources provided by Schools. Likewise, Akankwasa (2008) found out that although many teachers share beliefs that educational technology could promote learning and that the use of ICT is desirable, they are reluctant to use educational ICT because of insufficient support and resources. Last but not least, Munyantware (2006) in his study, "problems affecting teachers' adoption of technology in classrooms among science and mathematics teachers in Kisoro District", found that in addition to social support from colleagues, perceived support from the School influences teachers' adoption decision.

5.2 Conclusion

The factors that are affecting the use of integrated ICT in the primary schools in Bundibugyo include lack of teacher preparedness, lack of learners' preparedness, and lack of administrative preparedness. The teachers are not prepared because they are not trained to use ICT resources and they do not have access to computers, internet connection, projectors, whiteboards or websites. Why, because these resources are not available in their schools thus affecting ICT integration. In addition, the pupils are not prepared to use integrated eLearning because they lack ICT skills and there are no ICT resources in their schools to facilitate skills acquisition. Likewise, the administrators are not prepared to support the use of integrated eLearning in their schools because they lack the financial resources and ICT skills to dispense its implementation in the teaching-learning processes.

However, this study has come up with the most effective framework for integrating ICT in primary schools. This framework captures aspects of availability of ICT resources, accessibility, and usability, with both electricity and internet connection. In addition, the farmework presents teachers, learners, and administrators preparedness as possibilities of ICT integration.

5.3 Recommendations

The findings of this study indicate that the factors that are affecting the use of integrated ICT in the primary schools in Bundibugyo include lack of teacher preparedness, lack of learners' preparedness, and lack of administrative preparedness. Therefore, this study makes the following recommendations in that regard:

Teachers should be made prepared to use integrated ICT at primary school level by receiving frequent ICT related trainings. That is to say, the National Curriculum Development Centre (NCDC) should ensure that the approach is incorporated in the curriculum. It should be holistic, i.e. cater for all learners in all spheres.

Furthermore, the learners should be mentally prepared and gradually introduced to use integrated ICT so that they can grasp the content progressively without getting discouraged or frustrated with the ICT-enhanced learning process.

Additionally, the school administrators should support learners by providing ICT-related books in the library so that the learners can find time to make further discoveries on their own.

Similarly, the school administrators and Primary Teacher Association (PTA) members should employ ICT technical experts in their schools to help provide technical assistance such as repair, installation, maintenance, or technical advice to teachers and learners.

5.4 Future work

The experience of developed countries clearly shows that the ICT integration mechanism involves various actors in the process including academia, infrastructure, social entrepreneur, private sector, also the development partners. Major categories are government, private sector, academia and development partners. Initially, introduction of ICT integration will require huge efforts from all these stakeholders. An integrated approach will ensure the proper implementation of ICT integration in countries like Bangladesh.

After developing and validating the factors for quality ICT integration in 12 primary educational institutes, some assumptions may be abandoned, and others may be modified. Thus, more development research studies are needed to build up the foundation for a robust and at the same time contextualized framework to guide further development in this area. Similarly, the framework needs to be tested empirically in other contexts. Consequently, it needs to be validated by other role players' contributions in educational settings - particularly by pupils and teachers and by utilizing different instruments.

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APPENDIX I: INTRODUCTION LETTER

I am a candidate for Masters of Science in Information Technology at Kampala International University undertaking a research study on the topic **"Design of ICT Integration *Framework in Primary Schools: A case study of Bundibugyo District, Uganda***". In view of this, I request you to participate in this study. Kindly answer this questionnaire without leaving any question unanswered. Please be assured that the information you give will be treated with utmost confidentiality and will be used for academic purpose only. Before answering this questionnaire kindly read and sign the attached informed consent.

Thank you very much in advance.

Yours faithfully

…….

John Ziraba

APPENDIX II: CONSENT FORM

I am giving my consent to be part of the research study of Mr. Ziraba John on the topic: **"*Design of ICT Integration framework in Primary Schools:A Case Study of Bundibugyo District, Uganda*"**.

		Please tick
1	I confirm I have read and understood the information provided for the above research and had the opportunity to ask questions.	☐
2	I understand my participation is voluntary and that I am free to Withdraw at any time without giving a reason.	☐
3	I agree to take part in the research	☐

APPEND III: QUESTIONNAIRE

Section A: General Information

Instruction: please tick [√] the option that best describes you

1. Gender

a) Male ☐ b) Female ☐

2. Age

a) 20-29 years ☐ b) 30-39 years ☐

c) 40-49 years ☐ d) 50 years and above ☐

3. Educational Level

a) PTC Certificate ☐ b) Diploma ☐

c) Bachelor Degree ☐ d) Post Graduate Diploma ☐

d) Master's Degree ☐

4. How long have been working as a teacher?

a) 1-5 years ☐ b) 5-10 years ☐

c) More than 10 years ☐

Section A: Technological pedagogical content knowledge

1. How do you agree or disagree with the following statements?

ICT resources	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**
I can teach my subjects easily using a projector.				
I can easily teach students how to prepare a PowerPoint presentation.				
I can easily teach students how to search internet resources to get updated information about my subject area.				
I can teach students how to use a computer to solve academic problem (e.g. mathematics, geography maps etc.).				
I can easily use a whiteboard during my teachings.				

Section B: Administrative support

This section looks at the extent to which the head teacher, district education leadership (CAO, DEO and inspector) are supportive of the use of ICT resources in Bundibugyo Schools. Please indicate the extent to which you agree with the following statements.

ICT resources	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**
Technical support [e.g. offering ICT training opportunities for teachers]				
Financial support [e.g. buying ICT resources like computers, projectors etc.]				
Managerial support [e.g. head teacher encouraging teachers to often use computer during class lessons].				

Section C: ICT Resources

This section looks at how available, accessible or usable are the ICT resources in your School.

Availability of ICT resources

How do you agree or disagree on the availability of the following ICT resources in your School

ICT resources	**Available**	**Fairly available**	**Not available**
1. Computers in classroom			
2. Internet connection			
3. Projector			
4. Website			
5. Email			
6. Computer lab			
7. Whiteboard			

Accessibility of ICT resources

At the School, how often do you access ICT resources in the following locations?

ICT resources	**Never**	**Sometimes**	**Always**
1. Classroom			
2. Computer Labs			
3. Library			
4. School compound			

User-ability of ICT resources

How usable are the following ICT resources at your School?

ICT resources	**Usable**	**Fairly usable**	**Not usable**
1.Computers			
2.Projector			
3.Whiteboard			
4.Internet/email			
5.Computer lab			
6.Software packages [e.g. Microsoft Office]			

Section D: Validation of integrated e-learning framework at primary school level

This section looks at the extent to district education leadership (CAO, DEO and inspector) are aware of the possibility of integrating e-learning in primary schools in Bundibugyo Schools. Please indicate the extent to which you agree with the following statements.

ICT Resources	**Yes**	**No**
Does availability of ICT resources enable integrated ICT learning?		
Does accessibility of ICT resources enable integrated ICT learning?		
Does usability of ICT resources enable integrated ICT learning?		
Does availability of electricity enable integrated ICT learning?		
Does availability of internet connection enable integrated ICT learning?		

Teacher preparedness	**Yes**	**No**
Does teacher training in ICT enable integrated ICT learning?		
Does teachers' ability to teach using a projector enable integrated ICT learning?		
Does teachers' ability to teach students how to prepare a PowerPoint presentation enable integrated ICT learning?		
Does teachers' ability to use internet enable integrated ICT learning?		
Does teachers' competence in using ICT enable integrated ICT learning?		
Does teachers' ability to teach using whiteboard enable		

integrated ICT learning?		

Learners preparedness	**Yes**	**No**
Does learner's interest in using ICT resources enable integrated ICT learning?		
Does learner's curiosity to use ICT resources enable integrated ICT learning?		
Does learner's motivation to use ICT resources enable integrated ICT learning?		
Does learner's familiarity with ICT resources enable integrated ICT learning?		
Does learner's confidence in using ICT resources enable integrated ICT learning?		

Administrative preparedness	**Yes**	**No**
Does providing ICT training opportunities for teachers enable improved learning?		
Does buying ICT resources enable usccessful learning?		
Does employing ICT technician enable integration of ICT ?		
Does encouraging teachers to use ICT resources when teaching enable integrated ICT learning?		

THE END

APPENDIX IV: INTERVIEWS

1. How are teachers prepared in the integration of ICT in this Primary School?
2. How are administrators like you supportive in the integration of ICT in this Primary School in terms of financial support, technical support and managerial support?
3. How available are ICT facilities in this Primary School?
4. What common challenges are available that you think can affect the successful integration of ICT in this Primary School?
5. What solutions would you suggest to address the above mentioned problems?

THE END

APPENDIX V: MORGAN TABLE

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970