

**AN ASSESSMENT OF ICT ADOPTION BY TEACHERS IN SELECTED SECONDARY
SCHOOLS IN GASABO DISTRICT**

BY

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**A THESIS SUBMITTED TO THE SCHOOL OF COMPUTING AND INFORMATION
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INTERNATIONAL UNIVERSITY**

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DECLARATION

I declare that this thesis report is my original work and has not been submitted for any other award of a degree and published at any institution of higher learning.

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...../...../.....

Mutuyimana Aimable

Date

APPROVAL

This thesis report has been submitted for further examination with my approval as supervisor.

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Dr. Ssemalulu

...../...../.....

Date

DEDICATION

I dedicate this piece of work to my parents, relatives and close friends.

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My sincere gratitude is due to the Almighty God for the gift of life that He gave me throughout my studies.

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LIST OF ACRONYMS AND ABBREVIATIONS

AUC	Actual Usage of Computers
CCTV	Closed-Circuit Television
DOI	Diffusion of Innovation
EE	Effort expectancy
FC	Facilitating conditions
ICT	Information and Communication Technology
KIE	Kigali Institute of Education
KIST	Kigali Institute of Science and Technology
MM	Motivational Model
MPCU	Model of PC Utilization
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental Organizations
NICI	National Information and Communication Infrastructure
OLs	Learning Objects
PE	Performance expectancy
SCT	Social Cognitive Theory
SI	Social influence
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and User Technology
VCD	Video Compact Disc

ABSTRACT

To develop a model for ICT adoption in selected secondary schools in Gasabo District. This study was guided by the following objectives: i) to assess the availability of ICT facilities in the selected secondary schools in Gasabo district; ii) to determine the performance expectancy of ICT adoption by teachers in selected secondary schools in Gasabo District; iii) to determine the effort expectancy of ICT adoption by teachers in selected secondary schools in Gasabo District, Rwanda; iv) to determine the social influence of ICT adoption by teachers in selected secondary schools in Gasabo district, Rwanda; and v) to determine the facilitating conditions of ICT adoption by teachers in selected secondary schools in Gasabo district, Rwanda. The target population of the study was 134 teachers and sample size was 100 respondents. The total number of returned questionnaires was 75. Data was analyzed using frequencies and percentages; mean and standard deviations. The study revealed that ICT availability was fairly satisfactory (average mean=2.97, Std=1.103). Furthermore, the study revealed that performance expectancy was satisfactory (average mean=3.92, Std=1.043). In addition, the study revealed that effort expectancy of ICT adoption was satisfactory (average mean=3.79, Std=0.952). Similarly, the study revealed that social influence of ICT adoption by teachers was satisfactory (average mean=3.89, Std=1.020). Lastly, the study revealed that facilitating conditions of ICT adoption by teachers was satisfactory (average mean=3.89, Std=1.020). The study concluded that ICT adoption by teachers can be possible when ICT facilities are available and when the teachers have performance expectancy, effort expectancy, social influence and facilitating conditions. The study made the following recommendations: The need for the government to provide schools with ICT facilities such as internet and laboratories; the need for the schools to encourage teacher training in the use of ICT, and the need for the school management to offer their support in the adoption of ICT in schools. The study contributed to new knowledge when it found that availability of ICT facilities, performance expectancy, effort expectancy, social influence and facilitating conditions are the prerequisite for adoption of ICT by teachers in a secondary school setting.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

1.1.1 Historical Perspective

During the past three decades there has been an exponential growth in the use of information and communication technology (ICT) which has made pervasive impacts both on society and on our daily lives. It is thus not surprising to find increasing interest, attention and investment being put into the use of ICT in education all over the world (Yuen, Law & Wong, 2013). In addition to efforts to employ ICT to improve learning, the emergence of the knowledge economy has also brought about a much greater emphasis on education. A number of master plans on ICT in education has been produced in many countries (Pelgrum & Anderson, 2011). Such plans reveal that educational innovations in ICT have been increasingly embedded within a broader framework of education reforms that aimed to develop students' capacities for self-learning, problem solving, information seeking and analysis, and critical thinking, as well as the ability to communicate, collaborate and learn, abilities that figured much less importantly in previous school curricula. For example the Hong Kong Special Administrative Region (SAR) government's five year strategic plan on ICT implementation in schools launched in late 1998 shares this broader educational framework mentioned previously (Yuen, Law & Wong, 2013). With this launch, Hong Kong entered a very exciting period of rapid expansion and development in this area. The challenge involved was not simply a case of technological adoption, but rather a process of innovation, which required both financial and training support for schools, as well as cooperation between teachers and school leadership to ensure success.

The use of ICT in education is a new phenomenon in Africa. In the 1970's, its promoters claimed that it would transform and save education (Lockard & Abrams, 2011). The late 1980's saw a growing shift towards ICT adoption which emphasized the curriculum and not the tool. Its proponents felt that students would learn new skills as they needed them in order to make the computer work for them. The computer could now be viewed more as a partner as opposed to a competitor and could be treated in a more natural manner (Lockard & Abrams, 2011). The 1990's saw a heightened focus on increasing the use of computer technology in African

classrooms. However, while ICTs are pervasive in developed countries, their use has been and remains in a state of fluidity and their adoption by schools remains significantly underdeveloped in developing countries such as Kenya and Uganda (Kulik, 2014). It is highly ironic that this should be so in the 21st century, an era of information technology (IT).

The Rwandan government views Information and Communication Technology (ICT) as a key tool for transforming the economy, with the education sector playing an important role in developing the necessary human resources. In 2000 the government unveiled the National Information and Communication Infrastructure (NICI) plan to promote ICT in the country between 2001 and 2005. Since then there have been four phases of the plan: the second NICI plan (2006–2010), the third NICI plan (2011–2015) and the fourth NICI plan (2016–2020). The NICI plan recognizes the role of ICTs in education as a driving force for development (Rubagiza, et al., 2011). Education policy actions associated with NICI include: (i) The use of ICTs for formal and informal education; (ii) Raising public awareness of ICTs; (iii) Helping educational institutions improve their business processes; and (iv) Promotion of research and development.

Buttressed by the NICI plan the Ministry of Education (MoE) elaborated an ICT in Education policy in 2009. This policy states that the mission of the education sector is to create ‘a shared understanding for adopting ICT at all educational institutions, at all levels, to support the development of better teaching and learning to equip students with the 21st century skills’, (Rwanda Development Board, 2009). The policy was to further facilitate the training of primary and secondary school teachers on using ICTs in teaching and learning. It is expected that ICT in Education Policy will set a clear road map for adoption of ICT in education.

The education sector in Rwanda enjoys considerable political will in terms of designing and implementing programmes for mainstreaming ICTs in education. To a large extent the Ministry of Education has overseen an expansion of ICT infrastructure in primary and secondary schools. Through its ICT Unit, the ministry has overseen and coordinated different ICT activities and initiatives in the education sector; some of these include: the Ministry of education’s collaboration with World Links, an American NGO initiative that supplied used computers to primary schools in the early 2000s; the Ministry of Education initiative of supplying 10 computers per secondary school both private and public owned schools. By the end of 2006, 400 out of about 500 secondary schools in Rwanda had received these computers; the New

Partnership for Africa's Development (NEPAD) e-schools initiative, this project involved equipping six secondary schools in Rwanda with ICTs. The schools were provided with equipment (20computers, Internet connectivity, projectors, laptops and interactive whiteboards), contents (ICT skills training packages, subjects related materials) and support (troubleshooting and coordination).

This was part of a broader project that involved twenty (20) African countries with the aim of building capacity in ICT use in African countries; the training of teachers in basic ICT skills and maintenance at Kigali Institute of Science and Technology (KIST) and Kigali Institute of Education (KIE); more recently, the One laptop Per Child (OLPC) project, that was officially launched in October 2008 and has supplied over 5000 laptops to primary schools in three districts. These low-power and low-cost laptops are supplied free of charge to public primary schools whilst privately owned schools can purchase the same at a subsidized fee of USD 220 each. The overall aim is to equip every child at primary school level with a laptop in the future so as to make them computer literate. In 2007, ICT was officially introduced as a compulsory subject in the secondary school curriculum. All students had to spend at least 2 hours a week on learning ICT skills. The policy initiatives discussed above provide a background for understanding the context in which ICT is being introduced into schools in Rwanda. Whereas the vision behind these policy initiatives is clear, the aim within this research paper is to begin a process of understanding and theorizing the impact of such policy initiatives on the ground.

1.1.2 Theoretical Perspective

This study adopted the Unified Theory of Acceptance and use of Technology (UTAUT) by Venkatesh et al., 2003. UTAUT provides a refined view of how the determinants of intention and behavior evolve over time. It assumes that there are three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behavior (intention and facilitating conditions) (Venkatesh et al. 2003). These relationships are moderated by gender, age, experience, and voluntariness of use (Venkatesh, et al., 2003). Empirical testing of UTAUT shows that performance expectancy, effort expectancy, and social influence have significant relationships with the intention to use technologies (Venkatesh et al. 2003). Later studies found that social influence affect perceived usefulness and perceived ease of use. However, in post-adoption research, social influence on the continuance

intention was inconsistent; some studies reported significant relationships (Hong et al. 2006) but other studies reported non-significant relationships (Chiu & Wang, 2008). UTAUT is one theory that covers extensive individual difference constructs including gender, age, experience, and voluntariness of use as moderating variables. Even though there are some inconsistencies in previous studies on individual differences, scholars reported significant moderating effects by individual differences such as gender (Venkatesh & Morris, 2000; Venkatesh et al. 2003), age (Morris and Venkatesh, 2000), prior experience (Venkatesh & Davis, 1996), and voluntariness of use (Venkatesh et al. 2003).

1.1.3 Conceptual Perspective

The acronym ICT is taken to stand for information and communication technology or alternatively information and communications technology (Akbaba-Altun, 2014). On the other hand, Information and communication technology (ICT) is defined by Berceet al. (2011) as “a mixture of hardware (equipment), software (operating system, applications, etc.) and communication facilities (Local area Networks, wide area and backbone Networks, communication protocols, etc.)” (p, 190). In addition to that, Chiu & Wang (2008) also defined ICT as a tool. They stated that “ICT can be hardware (such as computers, digital cameras), software (such as Excel, discussion forums) or both. In the educational context, it mainly refers to various resources and tools (software) presented on the computer” (p. 149). Accordingly, the working definition adopted in this study defines ICT as any form of technology, be it analogue or digital, used as an educational tool for information or communication purposes.

ICT adoption refers to the process of determining which electronic tools and which methods of implementation are appropriate for given classroom situations and problems (Roblyer & Edwards, 2000). In this study, ICT adoption in secondary schools was operationalized as performance expectancy, effort expectancy, social influence and facilitating conditions.

1.1.4 Contextual Perspective

In Gasabo district, classical instructional methods have been and continue to be used in the teaching and learning process with their limitations in different circumstances varying depending on student and instructor needs. Little emphasis is being put on the embracement of educational technology, yet if properly used, ICT could provide an array of powerful tools that may help in

transforming the present isolated teacher-centered and text bound classroom into rich, students focused interactive knowledge environment (Rwanda Ministry of Education, 2015). In relation, to development in ICT adoption in Gasabo district, there is room for improvement as the usage rates for internet service facilities is at 41.4 % (never used internet) and 33.3 % are not aware of the service; and 78.2 % of the population of 6+ years have never used computer before (Ndizeye, 2016).

1.2 Problem Statement

The Rwandan government through the ministry of education has been mitigating ICT skills gap in the secondary schools by passing policies that make ICT learning mandatory and distributing personal computers to every secondary school in the country (Iradukunda, 2015). Proponents such as Tenopir (2013) and Renwick (2015) hold that ICT knowledge at school is instrumental in improving academic performance and shaping the brilliant leaders of tomorrow. However, a study by Alshmrany and Wilkinson (2017) indicated that several factors impede ICT adoption among teachers such as lack of suitable training, technical and administrative support, and systemic incentives (e.g., tenure and promotion), traditional pedagogical beliefs, and resistance to change are among the most widely held ones. However, it seems the ICT skills-gap among the teachers is long from over since most of them are still ill-equipped to integrate ICT in their classrooms. This study was intended to assess ICT adoption by teachers in selected schools in Gasabo district.

1.3 Purpose of the Study

To assess ICT adoption by teachers in terms of performance expectancy, effort expectancy, social influence and facilitating conditions in selected secondary schools in Gasabo District.

1.4 Objectives of the Study

- i. To assess the availability of ICT facilities in the selected secondary schools in Gasabo district.
- ii. To determine the relationship between ICT adoption and performance expectancy of teachers in selected secondary schools in Gasabo District.
- iii. To determine the relationship between ICT adoption and effort expectancy of teachers in selected secondary schools in Gasabo District, Rwanda.
- iv. To determine the relationship between ICT adoption and social influence of teachers in selected secondary schools in Gasabo district, Rwanda.
- v. To determine the relationship between ICT adoption and facilitating conditions of teachers in selected secondary schools in Gasabo district, Rwanda.

1.5 Research Questions

- i. Which ICT facilities are available in the selected secondary schools in Gasabo district?
- ii. What is the relationship between ICT adoption and performance expectancy of teachers in selected secondary schools in Gasabo District?
- iii. What is the relationship between ICT adoption and effort expectancy of teachers in selected secondary schools in Gasabo District, Rwanda?
- iv. What is the relationship between ICT adoption and social influence of teachers in selected secondary schools in Gasabo district, Rwanda?
- v. What is the relationship between ICT adoption and facilitating conditions of teachers in selected secondary schools in Gasabo district, Rwanda?

1.6 Scope of the Study

1.6.1 Geographical Scope

This study was carried out in Gasabo district. Gasabo district is located in the North East of Kigali City Province and bordered by Kicukiro district (South), Nyarugenge (West), Rwamagana (East) and Rulindo and Gicumbi (North).

1.6.2 Content Scope

This study was confined to ICT facilities available in selected secondary schools in Gasabo district; performance expectancy, effort expectancy, social influence and facilitating conditions of adopting ICT in selected secondary schools in Gasabo district.

1.6.3 Time Scope

This study took a period of 3 years and 5 months that is, from May, 2016 to October, 2019. This period was instrumental in data concept writing, proposal writing, field data collection, final analysis and consequent corrections and viva voce.

1.7 Significance of the Study

Most research about educational technology has focused on the impact of technology on learners. The lack of empirical studies notwithstanding, a set of assumptions about why teachers do not use technology does exist and is currently functioning as the theoretical base underlying many efforts to help teachers integrate technology with their teaching such as studies by Chumo and Kessio (2015); Attuquayefio and Addo (2014); Ntshakala and Obono (2013); and Oye et al., (2011) were done on ICT adoption in the secondary schools of Kenya, Tanzania, Ghana and Nigeria. However, none of the above studies have been done in Rwanda and more specifically, Gasabo district; hence there is a contextual gap that this study intended to cover. After this contextual gap is addressed, the study will add to the body of literature in the area of ICT adoption that will be of great benefit to educationists and other stakeholders by offering empirical data on the situation of ICTs in secondary schools in Gasabo district and to those who may want to improve education standards.

It is also envisaged that the findings of this study will facilitate the empowerment of the teacher for a more active role in the integration of ICT in the classroom. Subsequently, the increased role of the teacher in the process will in turn strengthen the ICT integration in the classroom and hence translate to better academic performance in the county.

This study will help the government of Rwanda to emphasize more on ICT adoption at primary, secondary and higher institutions of learning so as to achieve a desired outcome among the learners.

The results of this study will help policy makers to design policies that suggest the need for a more critical framework for examining issues related to the challenge of adopting ICT into schools from a social justice perspective. This will help create a shift that will focus on the digital divide discourse from questions of technological access to those of opportunities for

participation and the development of cultural competencies and social skills for full involvement in society.

This study will be useful to future researchers with interest in examining further the effects of ICT adoption on students learning outcome. This should lead to the generation of new ideas for the better implementation of ICT into learning process.

1.8 Definition of Key Terms

ICT: refers to a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information.

ICT Adoption: refers to performance expectancy, effort expectancy, social influence and facilitating conditions in secondary schools.

Secondary School: refers to a school intermediate between elementary and college and usually offering general, technical, vocational, or college-preparatory course.

Performance expectancy: refers to degree to which an individual believes that ICT adoption will help him access school services.

Effort expectancy: refers to the degree of ease associated with the use of ICT facilities.

Social influence: refers to the extent to which the individuals believe that others believe that they should use ICT facilities.

Facilitating conditions: refers to the perceived extent to which the secondary schools and technical infrastructure required support of ICT facilities.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviewed literature from different authors and scholars in accordance to the objectives of the study. The chapter was sub-sectioned into theoretical review, conceptual framework review of related literature and gaps of the study.

2.1 Theoretical Review

This study was anchored on the Unified Theory of Acceptance and Use of Technology (UTAUT) model as an assessment framework to understand the student's behavioral intention on acceptance and use of technology in the secondary schools in Gasabo district.

The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) is one of the most popular frameworks in the field of general technology acceptance models. Like earlier acceptance models, it aims to explain user intentions to use an information system (IS) and further the usage behaviour. Venkatesh et al. (2003) created this synthesized model to present a more complete picture of the acceptance process than was possible with any previous individual models. Eight models previously used in the IS field were merged in an integrated model, all of which had their origins in psychology, sociology, and communications. These models are the Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), TAM2, the Motivational Model (MM), the Model of PC Utilization (MPCU), Diffusion of Innovation (DOI), and Social Cognitive Theory (SCT). Each model attempts to predict and explain user behavior using a variety of independent variables.

A unified model was created based on the conceptual and empirical similarities across these eight models. The theory holds that four key constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions) are direct determinants of usage intention and behaviour (Venkatesh et al., 2003). Gender, age, experience, and voluntariness of use are posited to mediate the impact of the four key constructs on usage intention and behaviour. Moreover, the UTAUT model attempts to explain how individual differences influence technology use. More specifically, the relationship between perceived usefulness, ease of use, and intention to use can be moderated by age, gender, and experience. For example, the

strength between perceived usefulness and intention to use varies with age and gender such that it is more significant for male and younger workers. The effect of perceived ease of use on intention is also moderated by gender and age, such that it is more significant for female and older workers, and those effects decrease with experience (Venkatesh et al., 2003).

The UTAUT has four predictors of behavioural intention or usage: performance expectancy, effort expectancy, social influence and facilitating conditions. The predictors are defined as follows (Venkatesh et al., 2003, pp. 447-453): a) Performance expectancy (PE): is the degree to which an individual believes that using the system will help him or her to attain gains in job performance; b) Effort expectancy (EE): is the degree of ease associated with use of the system; c) Social influence (SI): is the degree to which an individual perceives that it is important others believe he or she should use the new system; and d) Facilitating conditions (FC): is the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.

Advantages of UTAUT

The UTAUT model has been praised for its capability to inform the understanding of factors, which determine the acceptance of an impending new technology. Although the model is quite new, its growth and popularity is increasingly high as compared to the preceding versions (Al-Hakim, 2007). Moreover, its stability, validity, and viability in technology adoption surveys within several contexts have already been ascertained and practically confirmed. For instance, the study by Alshehri (2012) in Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), and Theory of Planned Behavior (TPB) ascertained that UTAUT model enlightens the understanding of factors, which influence the acceptance of a vital new technology.

Most importantly, UTAUT model explains over 70% of all the technology acceptance behaviour, unlike other forms of model that explain as little as 40% of the entire technology acceptance behaviour. Therefore, UTAUT exposes more factors influencing the intention of the observed behaviour. Ultimately, it was intended to counter the deficiencies of prior models and theories by combining them together for a common good. For that reason, it has emerged as one of the most encompassing IT adoption theories (Grant, 2011).

Short comings of UTAUT

Even though this model has attained an adequate reception from most researchers, a number of shortcomings exist. Although each of the models utilizes several terminologies within their phraseology of acceptance, these aspects are often similar in nature. Subsequently, every model has its own shortcomings, which also influences the ultimate viability of UTUAT model as a whole (Cetron, 2007). UTAUT has limitations mainly in its relationship between the intention and use of behaviour. Nevertheless, the benefits obtained from this model are far more significant than the shortcomings listed above (Mayer-Schönberger & Lazer, 2007).

Based on its limitations, researchers resolved to add precipitating occasions in order to measure the impact of external factors like government policy, and new markets on Information Technology innovations. They observed the impact of the tendency to act as a diplomat among the determinants intensions and usage behaviour. It was noted that where tendency to act is high, taking action might be more probable (Jaeger & Matteson, 2009). Based on UTAUT limitations, researchers added precipitating events so as to measure the impact of external aspects like government policy, new markets, and financial crises. They added these factors to IT innovations and adoption and scrutinized the impact of propensity to perform as a moderator on the association between the determinants intension and custom behaviour.

It was noted that where the condition of propensity is high, taking action will be more foreseeable. Based on research, it is evident that precipitating occasions might capture the influence of external aspects on the behavioural intension to make a start, enhance the model, and fill intension-behaviour gap (Grant, 2011). In that case, it is evident that entrepreneurs have different perception on UTAUT because some of them believe that it is a fairly developed model. As a result, this has influenced more than a few organizations to consider other types of models apart from UTAUT (Xiang & Tussyadiah, 2013).

Reasons for adopting UTAUT model in the current study

This study preferred the Unified Theory of Acceptance and Use of Technology (UTAUT) model because it consolidates previous TAM related studies. UTAUT aims to explain user intentions to use an IS and subsequent usage behaviour. UTAUT suggests four core constructs to explain and predict user acceptance of technology adoption, which are: performance expectancy (equivalent to perceived usefulness), effort expectancy (equivalent to perceived ease of use), facilitating conditions and social influence. These constructs explain up to 70% of the variance in usage intention.

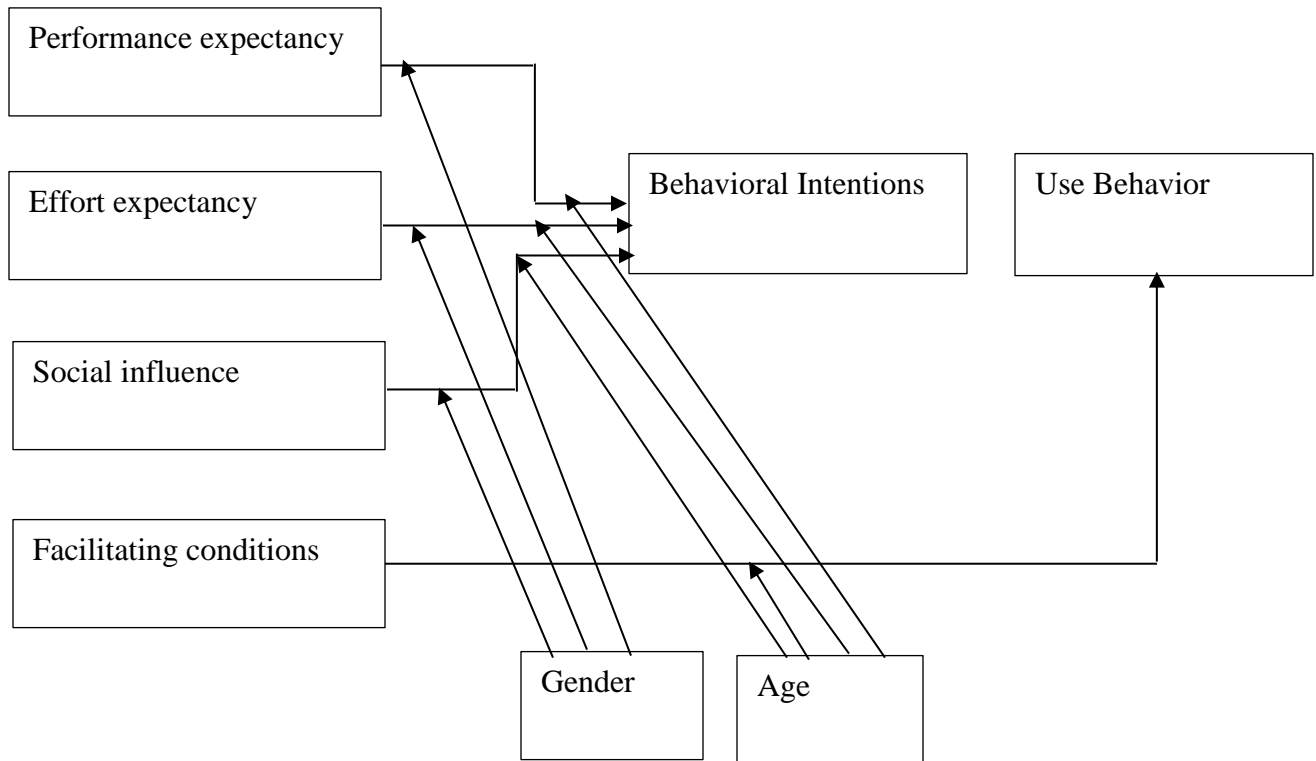


Figure 1: The UTAUT Model

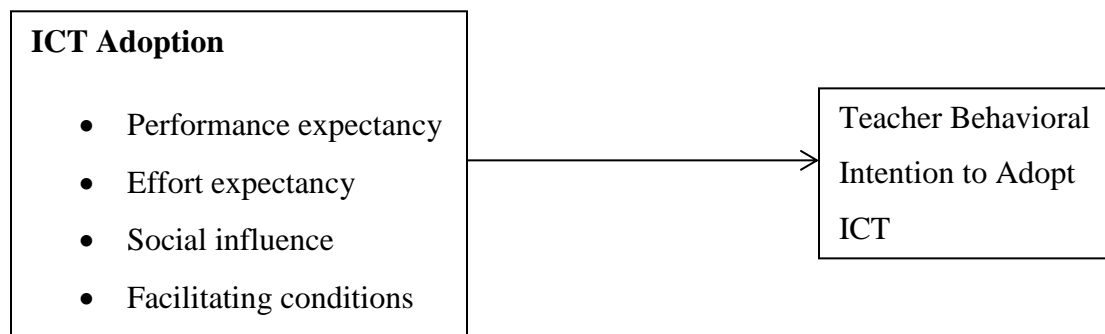
Source: Venkatesh et al., (2003)

The model comprises of the following moderating variables; gender and age which affect the performance of the factors. In the UTAUT model, performance expectancy, effort expectancy and social factors variables have direct effects on the behavioral intention which in turn impacts the use behavior. However, facilitating conditions variable has direct effect on the use behavior.

The effect of facilitating conditions on behavioral intention is not considered because it is assumed non-significant when both performance expectancy and effort expectancy have been included (Venkatesh et al., 2003; Schepers & Wetzels, 2007). These factors affect the use behavior and subsequently ICT adoption.

2.2 Conceptual framework

Figure 2 shows a diagrammatical representation of a model for ICT adoption in selected secondary schools in Gasabo district, Rwanda.



Source: Adapted from: Venkatesh et al., (2003)

Figure 2: Conceptual Framework

2.3 Review of Related Literature

2.3.1 ICT Adoption

The ICTs include a mixture of hardware (computers), software (Microsoft Office Tools) and telecommunication (Wi-Fi, e-mail, cellular phones, and internet). Gulbahar (2007) asserts that, despite huge educational ICT investments in teaching and learning, there is little evidence of their adoption. As White et al. (2002) point out, conditions which can facilitate innovative teaching and learning include ensuring that learning goals are achievable using the ICT tools; using ICT tools as one resource among others, which may include provision of professional development and technical support, making equipment available, and working to change teacher negative beliefs about ICT in teaching and learning.

The ICT adoption in education has been motivated by its evidenced positive impact on the education provision, quality and support. In line with this, Christie (2002) firmly contends that ICT is at the heart of life-long learning, learner-centred education, off-campus course delivery

and enhanced educational collaboration. Without a doubt, with ICT, learners are able to co-construct knowledge, acquire practical and enriched experiences as they develop high order thinking and problem-solving skills (Madge & O'Connor, 2004). This is actually connected with the fact that ICT forces changes in instructional process, enables easy access to a lot of e-resources, collaboration and activity of groups of learners, and provides the possibility for the teachers to offer individual support to their students(Uibu & Kikas, 2008). The fact that ICT forces changes in institutional process also particularly empowers learner's lifelong learning chances (Debande & Ottersten, 2004). Nevertheless, the presence of ICT in education and its impact in some cases of primary and secondary education could not be ascertained. With respect to this issue, Rodriguez et al. (2011) attribute the causes of the lack of ICT impact on students' achievement to four major components namely the design and implementation, evaluation procedures, the type of innovations and the cost-effectiveness.

One of the major trends of educational reform is geared towards acquiring and using information technology. According to Reiser (2001), two major tracks arose in educational technology at the beginning of major ICT use in education, from the 1980s on: computer-supported learning (also referred to as computer-aided learning and computer-based training) and the use of computer as a tool. The former consisted of different kinds of educational software, which still has a strong representation in learning objects (LOs).

The general impression is that integrating technology in learning and teaching is very valuable asset in the process of learning, appealing to many aspects of students' learning, and hence, it is vital to adopt ICT in education (Oye et al. 2011). Sife, et al.2014) argued that ICTs have not permeated a great extend in many higher learning institutions, not only in Tanzania but in many developing countries, due to many socioeconomic and technological circumstances. In their article, they observe that despite the achievements that the institutions of higher learning education in Tanzania have accomplished they still face many challenges in undertaking the ICT adoption process. The challenges include lack of a system approach to learning, awareness and attitudes towards ICTs, administrative and technical support, staff development, and lack of ownership, inadequate funds, and transforming higher education.

Public expectations for ICT and educational systems have increased with the ubiquity of digital technologies in daily life. Currently, the discourse has been predominantly instrumental, focusing

on skills and the use of ICT in the service of curriculum and instruction. Despite the fact that computers have been widely available in educational setting for more than two decades, hitherto, teachers are neither confident nor competent users of ICT (Oye et al. 2011).

A Study by (Kerry, 2010), for instance, indicate that many practicing teachers feel unprepared to use ICT in their classrooms. In like manner, (Wei-Tsong & Chao-Yueh, 2011) found that many student teachers have low self-efficacy towards ICT and have negative attitudes towards ICT. The fact that both corporations and institutions of higher learning are increasingly adopting ICT as tools for learning, collaboration, communication, curriculum development, and staff development cannot be overemphasized. The case of ICT for education and training are more critical today than ever before since new means of improving instructional methods are triggering a change in the delivery of education (Pajo and Wallace, 2011). Undoubtedly, ICT makes access to education more flexible and reduces barriers of time and place. Asynchronous web based technologies, for example, can advance the effectiveness of learning by bringing learners into contact with learning peers from around the world (Lea, et al., 2012). In addition, Communication technologies can also enhance the quality of university teaching and research.

The Internet has emerged arguably the most visible component of the information and communication technologies (ICTs). The rate of adoption of the Internet exceeds that of all technologies before it. Its use ranges from communication, publishing to research. The dynamics of adoption and usage of ICTs could be examined at three levels, which are the macro- (national), meso- (sectorial), and micro- (organizational and individual) levels. Oyelaran-Oyeyinka and Adeya (2014) and Achimugu and Afolabi (2015) investigated the level and depth of use of computers by university staff. From their survey, in Nigeria, 58.5% use computers for word processing, 32.2% use it for spreadsheet and data processing and 20.5% use it for programming, 66.9% use it for e-mail/Internet while 9.4% use the computer for other purposes apart from the aforementioned. Respondents suggested that resources be directed at training lecturers/researchers to incorporate the use of computer applications in academic functions.

There is a higher degree of e-mail and Internet use within the private universities compared to the public Universities. The main reason could be as a result of better facilities at some of the private universities coupled with lower densities of users per access point. This implies faster connections, shorter waiting times, less congestion and lower cost as the private institutions often

provide free access for the staff. The challenges facing Nigerian Public Universities pertaining ICT acceptance and usage for teaching and learning is primarily lack of commitment by the government in terms of funding, staff training and stable power supply (Oye et al., 2011).

government in terms of funding, staff training and stable power supply (Oye et al. 2011).

2.3.1.1 Availability of ICT facilities

Information and Communication Technologies (ICT) have become key tools and had a revolutionary impact on how we see the world and how we live. Today, the place of ICTs in education and the world in general cannot be undermined. Modern day businesses are conducted and facilitated through the use of telephones, fax machines and computer communication networks through the internet. The phenomenon has given birth to the contemporary e-commerce, e-government, e-machine, e-banking and e-education among others. According to Bamidele (2006), ICT is a revolution that involves the use of computers, internet and other telecommunication technology in every aspect of human endeavour.

Aribasala (2006) posited that ICT are increasingly playing an important role in organizations and in society's ability to produce, access, adopt and apply information. They are however being heralded as the tools for the post-industrial age and the foundations for a knowledge economy due to their ability to facilitate the transfer and acquisition of knowledge. Stressing the importance of the use of ICT in schools, Olorunsola (2007), posited that through ICT, some educational needs have been met; it changes the needs of education as well as the potential processes.

Looking at the role of education in the national building and the population explosion in technical colleges these days, the use of ICT in the teaching and learning process becomes imperative. This is because its adoption by teachers will enhance effective teaching. Issues like good course organization, effective classroom management, self-study collaborative learning, tax oriented activities, and effective communication between the actors of teaching-learning process and research activities will be enhanced by the use of ICT based technology. Teaching and learning has gone beyond the teacher standing in front of a group of pupils and disseminating information to them without the students' adequate participation (Ajayi, 2008).

The various ICT facilities used in the teaching and learning process in technical colleges according to Babajide and Bolaji (2003), Bryers (2004), Bamidele (2006) and Ofodu (2007) include; radio, television, computers, overhead projectors, optical fibres, fax machines, CD-Rom, internet, electronic notice board, slides, digital multimedia, video/VCD machine and so on. It appears some of these facilities are not sufficiently provided for teaching and learning process in the technical colleges. This might account for why teachers are not making use of them in their teaching.

According to Ajayi (2008) the use of these facilities involves various methods which include systematized feedback system, computer-based operation/network, video conferencing and audio conferencing; internet/worldwide websites and computer assisted instruction. It should be stressed that the effective use of the various methods of ICT in teaching and learning depends on the availability of these facilities and teachers competences in using them. There are developments in the Nigerian education sector which indicate some level of ICT application in technical colleges teaching and learning processes.

The Federal Government of Nigeria, in the National Policy on Education (Federal Republic of Nigeria, 2004), recognizes the prominent role of ICTs in the modern world, and has integrated ICTs in to education in Nigeria. To actualize the goal, the National Policy on Education (2004) states that, government will provide basic infrastructure and training at the primary level, at the junior secondary level, computer education has been made a pre-vocational elective and is a vocational elective at the senior secondary level.

It is evident that we live in a time of rapid technological change which modernized every aspect of our lives; be it social, physical and intellectual. These technological changes also affected the way we teach and learn. To improve education is essential to the creation of effective human capital in any country (Evoh, 2007). The need for ICT in colleges and schools cannot be overemphasized in this technology-driven age, every one requires ICT competence in order to gain and share information. Organizations are finding it very necessary to train and retrain their employees to establish or increase their knowledge of computer and other ICT facilities (Adomi and Anie, 2006; Tyler, 1998).

This calls for early acquisition of ICT skills by the students. The ability to use computers effectively has become an essential part of every one's education. Skills such as book keeping, clerical and administrative work, and science/technological disciplines now constitute separate sets of computerized practices that form the core IT skills package; spreadsheets, word processors, database, CorelDraw, etc. (Raffel and Whitworth) (2002). The demand for computer/ICT literacy is increasing because employees realize that computer can be a threat to their jobs, and the only way to enhance job security is to become computer literate with the high demand for computer literacy, the teaching and learning of these skills is a concern among professionals (Ochroye, n.d.).

2.3.1.2 The Relationship Between ICT Adoption and Performance Expectancy

The degree to which an individual believes that ICT adoption will help him access school services. Performance expectancy is the strongest predictor of intention and consistent with earlier models tested by Agarwal and Prasad (1998). The predictive effect of performance expectancy is mediated by age, gender and experience. Earlier research conducted by Calvert et al. (2005) found that at early ages there was no significant difference between boys and girls in using computers however, at later ages, girls' interest wanes. In related research by Afarikumah and Achampong (2011), the perception of computer usefulness was found to be irrespective of age and student level. Many studies found that performance expectancy play significant role in intention to adopt information technology (Carter et al., 2011; Benbasat and Barki, 2007; Alraja, 2015).

Venkatesh et al. (2003) integrated five concepts from various models into the construct of performance expectancy, namely perceived usefulness, extrinsic motivation, job-fit, relative advantage and outcome expectations. The concept of perceived usefulness was introduced by Davis (1986) in the Technology Acceptance Model and adapted by Taylor and Todd (1995) in their C-TAM-TPB. The definition of this concept is similar to the one of performance expectancy and refers to an individual's perception about the likelihood that the use of a system will enhance his or her performance on the job (Davis, 1986; Taylor and Todd, 1995). When the encouragement to perform an activity is achieving external outcomes, the motivation to do this is called extrinsic. Examples of extrinsic motivation are rewards and punishments such as salary, grades or promotions (Davis et al., 1992). Job-fit as a third concept can again be explained by the

believe of an individual that accepting the technique or technology will lead to gains in job performance (Thompson et al., 1991).

The extent to which an individual perceives a new technology as being more useful than the previous one, simply explains the concept of relative advantage (Rogers, 1995). Bandura (1986) introduced outcome expectations in his Social Cognitive Theory. This concept is divided into performance-related (or job-related) and personal-related outcome expectations (e.g. sense of accomplishment and self-esteem). The similarities between these concepts are acknowledged by several researchers (Davis, Bagozzi, & Warshaw, 1989; Plouffe, Hulland, & Vandenbosch, 2001).

2.3.1.3 The Relationship Between ICT Adoption and Effort Expectancy

Effort expectancy is the degree of ease associated with the use of ICT facilities. The Effort expectancy construct within each model is significant in both voluntary and mandatory usage contexts; however, each one is significant during the first time period, becoming non-significant over periods of extended and sustained usage (Venkatesh et al 2003) which is consistent with previous research (e.g., Agarwal and Prasad 1997, 1998; Davis et al. 1989; Thompson et al. 1991, 1994). To this end we expect effort expectancy to be more prominent in the embryonic stage of every behavioural intention to use ICT for learning by students. It is also expected that increased levels of ease of use of ICT will also increase the behavioural intention to use ICT. It is apparent that experienced users would tend to be less influenced by the ease of using computers.

According to Al Mulhim (2014), effort expectancy represents the amount of effort the users expect it will take to use a technology. In the Rwandan school system, a lack of technical support and the low level of ICT competence among teachers make the implementation of ICT difficult. In addition, the lack of access to technology, the lack of training and the lack of time all lead to discouraging effort expectancy (Alhawiti, 2013). However, it was anticipated that if this study showed that the perceived difficulties involved in using ICT at the secondary school level could be eliminated, effort expectancy would become more positive. That is, if the secondary school teachers could experience ICT and find it easy to use, they would likely find the technology useful and develop a positive behavioural intention to ICT in their daily activities in school.

2.3.1.4 The Relationship Between ICT Adoption and Social Influence

Social influence is the extent to which the individuals believe that others believe that they should use ICT facilities. Social Influence in all the models contains the explicit or implicit notion that the individual's behaviour is influenced by the way in which they believe others will view them as a result of having used the technology (Venkatesh et al. 2003). Social influence can directly affect intention to use technology. Superiors, faculties and peers of students can influence their overall behavioural intention to use ICT provided for learning. According to Hartwick and Barki, (1994) reliance on others' opinions in technology acceptance literature is significant only in mandatory settings.

According to the authors of the UTAUT model, facilitating conditions have a positive relationship with technology usage. In earlier models such as TPB and DTPB, facilitating conditions predict intention when effort expectancy is unavailable. However, in MPCU and IDT, prediction of facilitating conditions on behavioural intention is non-significant (Venkatesh et al 2003). In situations where an individual believes that support to use technology is erratic, influence on intentions to use technology will be significant. However, where the support is consistent we expect facilitating conditions to directly influence use behaviour. It is therefore expected that facilitating conditions will predict use behavior.

Social influence includes the impact of one teacher's behaviour on another's. Ultimately, colleagues, principals, family and friends all influence one another. If the environment in the school and among friends and family is technology oriented, it is highly possible that the teachers will be interested in using technology in the classroom to make study more attractive and easy (Birch & Irvine, 2009). They may, themselves, be familiar with ICT and enjoy using it.

2.3.1.5 The Relationship Between ICT Adoption and Facilitating Conditions

Facilitating conditions is the perceived extent to which the secondary schools and technical infrastructure required support of ICT facilities. According to the authors of the UTAUT model, facilitating conditions have a positive relationship with technology usage. In earlier models such as Theory of Planned Behavior (TPB), facilitating conditions predict intention when effort expectancy is unavailable. However, in Model of PC Utilization (MPCU) and Innovation Diffusion Theory (IDT), prediction of facilitating conditions on behavioural intention is non-

significant (Venkatesh et al. 2003). In situations where an individual believes that support to use technology is erratic, influence on intentions to use technology will be significant. However, where the support is consistent we expect facilitating conditions to directly influence use behaviour. It is therefore expected that facilitating conditions will predict use behavior.

According to Alshmrany and Wilkinson (2017), facilitating conditions are enablers in the environment, e.g., the availability of organizational resources and support structures to facilitate the use of a communications system. The quality of the resources influences a person's perception of the ease or difficulty of performing a task using a technology (Teo, 2011). In secondary schools, facilitating conditions for the teachers are the related resources, such as technical help, infrastructure, hardware, and software (Bingimlas, 2009). Facilitating conditions have a significant effect on users' effort expectancy of ICT use, and also have an impact on the intention to use new technologies (Fathema, et al., 2015). Without a supportive environment, it is very difficult to plan to adopt ICT, regardless of how much a teacher might like to.

2.3.2 Related Studies

A study by Chumo and Kessio (2015) used UTAUT Model to assess ICT adoption in Kenyan public universities. The results indicated that effort expectancy, performance expectancy and social influence factors affected the student's behavioral intention, which ultimately affected adoption of web based information system. The model explained 78.24% of the variance of the student's behavioral intention to use web based information systems. These results suggested UTAUT to be a suitable framework for studying technology adoption decisions among Kenyan students in public universities.

Attuquayefio and Addo (2014) used the UTAUT model to analyze students' ICT adoption in Ghana. The Unified Theory of Acceptance and Use of Technology (UTAUT) model Venkatesh et al (2003) was employed by the researchers to determine the strength of predictors for students' intention to accept and use ICT for learning and research. Effort Expectancy (EE) (0.4, $p < .05$) significantly predicted Behavioural Intention (BI) to use ICT, while Social influence (SI) and Performance Expectancy (PE) were statistically insignificant, as was Behavioural Intention (BI) on Use Behaviour (UB). However, Facilitating Conditions (FC) ($\beta=.26$, $p < .01$) significantly

influenced UB. The study recommended that future studies should include students from other faculties and multiple universities for more reliable results and conclusions.

Ntshakala and Obono (2013) carried out a study on the framework of the factors affecting the adoption of ICT for Physical Education (PE). Based on the assumption that Information and Communication Technologies (ICTs) can contribute to the development of PE in schools, this study aimed to design a model of the factors affecting the adoption of ICTs for PE in schools. The proposed model was based on a sound theoretical framework. It was designed following a literature review of technology adoption theories and of ICT adoption factors for physical education. The technology adoption model that fitted to the best all ICT adoption factors was then chosen as the basis for the proposed model. It was found that the Unified Theory of Acceptance and Use of Technology (UTAUT) was the most adequate theoretical framework for the modeling of ICT adoption factors for physical education.

Oye et al. (2011) carried out a study on a model of ICT acceptance and use for teachers in higher education institutions in Nigeria. The study considered the TAM and UTAUT models to understand the teacher's behavioral intention on the acceptance and use of the technology. The results showed that among the four UTAUT constructs, performance expectancy exerted the strongest effect. Therefore performance expectancy was considered the most influential factor for the acceptance and use of ICT by the respondents. Recommendations made were that, all employed teachers in Federal, State and Private universities should undertake mandatory training and retraining on ICT programmes.

Cassim and Eyono (2011) conducted a study to examine factors affecting the adoption of ICT for the teaching of word problems. This aim was achieved within the theoretical framework of the Technology Acceptance Model (TAM) by the quantitative analysis of data collected from a questionnaire based survey of 102 foundation phase teachers (grades 2, 3, & 4). These teachers were selected from 36 schools from the KwaZulu Natal province of South Africa. According to the statistical and descriptive analysis of the survey data, teachers' awareness of ICT, their attitude towards ICT, their perceptions on the usefulness and on the ease-of-use of ICT were moderate; but their level of adoption of ICT for the teaching of word problems was generally low. The inferential statistical analysis of these variables also shows that all the above listed factors significantly influence the adoption of ICT for the teaching of word problems. In

addition, this research found that among the teachers that are aware of the general importance of ICT in teaching, there are higher levels of ICT adoption for the teaching of word problems in urban areas compared to rural areas.

2.4 Gaps of the Study

Several studies by Chumo & Kessio (2015); Attuquayefio & Addo (2014); Ntshakala & Obono (2013); and Oye et al. (2011) have been done on ICT adoption in the schools of Kenya, Tanzania, Ghana and Nigeria. However, none of the above studies have been done in Rwanda and more specifically, Gasabo district; hence there is a contextual gap that this study intended to cover.

HAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter dealt with the practical procedures which were used in carrying out this study. It gives details of the research design to be adopted, population of study, nature of sample, sampling procedure, data collection procedures and the final data analysis techniques that were applied. It gives the framework within which data was collected and analyzed.

3.1 Research Design

This study employed a cross-sectional research design which helps in the study of a particular phenomenon in a specific time (Easterby-Smith et al. 2008). 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. The choice of this design is dependent on the nature of the study variables.

3.2 Study Population

Gasabo has a total of 142 secondary schools with a population of 1,729 teaching staff (Ndizeye, 2017). The researcher however used purposive sampling to select the best performing schools in the last 5 years in the national examinations. The researcher selected only 5 public secondary schools due to the short academic time allotted for research. Thus the target population was 134 respondents.

3.3 Sample Size

The study used Slovene's formula to compute the sample size of the respondents Ghozali (2006).

The formula is: $n = \frac{N}{1+N(\alpha)^2}$

Where: n = sample size; N = target population; and e = margin of error at = 0.05

$$n = \frac{134}{1 + 134(0.05)^2}$$

$$n = \frac{134}{1 + 134(0.0025)}$$

$$n = \frac{134}{1.335}$$

$$n = 100$$

Therefore the sample size of this study was 100 respondents.

Table 3.1 gives the summary of target population and sample size of the participants.

Table 3.1: Target Population and Sample Size

Name of School	Target Population	Sample size
	Teaching Staff	Teaching Staff
G.S APRED NDERA	28	21
G.S KINYINYA	27	20
E.S BUMBOGO	24	18
FAWE GIRLS	29	22
G.S RUTUNGA	26	19
Subtotal	134	100

3.4 Sampling Techniques

The researcher used simple random sampling to select the teachers from the human resource book. The researcher then wrote the names of the teachers in pieces of papers and placed them in a bowl and shook the bowl. The researcher then randomly picked the names of the teachers until the number he needed was achieved. This was intended to give each participant the opportunity to participate in the study.

3.5 Data Sources

This study collected primary data using questionnaire and observation methods. Questionnaire was preferred because it is quick, cheap and covers a big population within a short period of time. Observation was also preferred because it gives the researcher exactly what he is seeing in real life.

3.6 Data Collection Methods

The study used survey questionnaires to collect primary data on the research objectives two, three, four and five (Saunders et al. 2007). Questionnaire was used to collect data on ICT adoption in the secondary schools in Gasabo. The researcher distributed the questionnaires to the teachers. The researcher preferred questionnaires because it gives clear and specific responses and enable the respondents to express themselves freely. On the other hand, the researcher used observation method to collect data so as to support the findings in the questionnaire.

3.7 Data Collection Instruments

3.7.1 Questionnaires

This study employed closed questionnaires; where some questions are presented and the responses are fixed and the respondent is expected to choose the answer from the options given him/her. The questionnaires were distributed to both the students and the teaching staff. Questionnaire was used to collect data from the student respondents. The questions were scaled using a five Likert scale of 1=strongly disagree; 2=disagree; 3=not sure; 4=agree; and 5=strongly agree. Questionnaires were preferred by the researcher because large amounts of information can be collected from a large number of people in a short period of time and in a relatively cost effective way (Saunders et al. 2007). The results of the questionnaire can usually be quickly and easily quantified by either a researcher or through the use of a software package such as Statistical Package for Social Sciences (SPSS). It can also be analyzed more scientifically and objectively than other forms of research.

3.7.2 Observation Method

This study used observation method to collect data on the availability of ICT facilities in the selected secondary schools. Specifically, the researcher observed the availability of computer laboratory, desktop computers, projectors, internet connection, ICT laboratory personnel, and a website. The availability of these ICT facilities would imply that a school has adopted ICT in its environment.

3.8 Validity and Reliability

3.8.1 Validity

Validity refers to how well a test measures what it is purported to measure (Cozby, 2001). This study used content validity to ensure that the instrument is actually measuring what it is intended

to measure (i.e. the construct), and no other variables. This was achieved by using a panel of experts familiar with the construct. The experts (i.e. researcher's supervisor and research defense panel members) examined the items and what that specific item intended to measure. The researcher's colleagues were involved to obtain their feedback. After the whole process, the content validity index (CVI) was computed.

$$\text{Formula (CVI)} = \frac{\text{items declared relevant by experts}}{\text{total number of items}}$$

Amin (2005) says if the $\text{CVI} \geq 0.70$, the instruments are considered valid, otherwise it is not.

$$\text{CVI} = \frac{15}{17} = 0.88$$

The CVI results showed that the items were valid as guided by Amin (2005).

3.8.2 Reliability

Reliability is the degree to which an assessment tool produces stable and consistent results (Neuman, 2005). This study used three types of reliability tests, that is: test-retest reliability, inter-rater reliability, and internal consistency reliability. In the test-retest reliability, the researcher administered the instruments twice to the same respondents (10 secondary school teachers from one school in Gasabo district). The scores from time 1 and time 2 were correlated in order to evaluate the test for stability over time. The results in this case were found to be consistent since the Pearson correlation results showed 0.74, and 0.75 in the first and second time respectively.

Furthermore, the study employed inter-rater reliability. This was achieved by distributing the research instruments to the experts in the field of ICT at Kampala International University. The experts included the researcher's university supervisor and the members of the research defense panel. The researcher used their expert knowledge, criticism and advice to adjust the instrument accordingly.

In addition, the researcher used internal consistency to evaluate the degree to which different test items that probe the same construct produce similar results. This was achieved using Cronbach's

alpha. According to Downing (2004), if the Cronbach's alpha values are ≥ 0.70 , the instrument is reliable, otherwise it is not.

Table 3.2: Reliability of Results

Variables	No. of items	Cronbach's alpha
Performance expectancy	4	0.783
Effort expectancy	4	0.716
Social influence	2	0.695
Facilitating conditions	3	0.796

The results in table 3.2 reveal that there is high internal consistency among the variables, hence an indication that the instrument is reliable.

3.9 Data Collection Procedures

An introduction letter was obtained from the College of Higher Degrees and Research of Kampala International University after the approval of the validity of the research instruments. The researcher briefed the respondents about his intentions to carry out a study at their school premises. The researcher asked the respondent to answer all the questions in the questionnaires.

3.10 Data Analysis

Data from the field was compiled, sorted, edited and coded to have the required quality, accuracy and completeness. Then it was entered into the computer using the Statistical Package for Social Sciences (SPSS v. 17.0) for analysis. During the analysis of the data, frequencies and percentage distribution was used to analyze data on the profile of the respondents. Means and Standard Deviations were used to determine the central tendency and measure of dispersion of ICT adoption in selected secondary schools. In order to interpret data, the following numerical values and descriptions were used.

Table 3.3: Mean Interpretation

#	Mean Range	Response Mode	Interpretation
5	4.21-5.00	Strongly agree	Very satisfactory
4	3.41-4.20	Agree	Satisfactory
3	2.61-3.40	Not sure	Fairly satisfactory
2	1.81-2.60	Disagree	Unsatisfactory
1	1.00-1.80	Strongly disagree	Very unsatisfactory

Pearson linear correlation coefficient was used to determine the relationship between the independent variables (ICT adoption), and the dependent variable (performance) of selected secondary schools.

3.11 Ethical Considerations

The researcher got authorization letter from the School of Computing and Information Technology of Kampala International University before conducting any research. Furthermore, consent of the respondents was verbally sought before they could be involved in the study. In addition, the names or identifications of the respondents were anonymous and information collected from them was treated with utmost confidentiality. In addition, the researcher acted honestly, fairly and respectfully to all other stakeholders that were involved in this study. Not only that, the researcher accurately attributed to the sources of information in an effort to celebrate the works of past scholars or researchers. This ensured that no plagiarism occurred. Last but not least, the researcher worked according to generally acceptable norms of research.

3.12 Limitations of the Study

- i. Uncooperative behavior of some respondents, un-approachable respondents and those who were reluctant to give information limited the researcher in this study. However, the researcher mitigated this by assuring the respondents that the study was for academic intentions only and he showed them his university identity card and university transmittal letter permitting him to carry out the research.
- ii. Furthermore, the researcher was limited by extraneous variables such as honesty of the respondents where some of them did not say the truth. The researcher mitigated this by encouraging the respondents to be truthful since the results of the study if released would help them get further donations of ICT facilities in their schools.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

4.0 Introduction

This chapter presents the analysis of the data gathered and interpretation thereof. It gives the demographic characteristics of the respondents and variables used.

4.1 Response Rate

The researcher distributed 100 questionnaires but was able to retrieve only 75 questionnaires that were correctly filled and answered. This gave a retrieval rate of 75%; according to Amin (2005), this is enough to carry on and continue with data analysis. It is also appropriate for generalization of the findings.

4.2 Demographic Characteristics of the Respondents

The demographic characteristics of the respondents were measured using gender, age, educational level, and work experience. Table 4.1 gives the summary of the findings.

Table 4.1: Demographic Characteristics of the Teaching Staff

Gender	Frequency	Percent (%)
Male	44	58.7
Female	31	41.3
Total	75	100.0
Age		
20-29 years	15	20.0
30-39 years	53	70.7
40-49 years	07	9.3
50 years and Above	00	00.0
Total	75	100.0
Education Level		
Certificate	0	00.0
Diploma	45	60.0
Degree	30	40.0
Master	0	00.0
Total	75	100.0
Work Experience		
1-5 years	23	30.7
6-10 years	52	69.3
More than 10 years	0	00.0
Total	75	100.0

Source: primary data, 2018

The results presented in table 4.1 revealed that majority, 58.7% of the respondents were male while the female were represented by 41.3%.

Furthermore, table 4.1 revealed that majority, 70.7% of the respondents were within the age group of 30-39 years, followed by 20% who were within the age group of 20-29 years and lastly 9.3% who were within the age group of 40-49 years. None of the respondents were 50 years and above.

Similarly, table 4.1 revealed that majority, 60% of the respondents were Diploma Holders, while 40% were Degree Holders. None of the respondents had a Certificate or Masters Degree Qualifications.

Last but not least, the results in table 4.1 revealed that 69.3% of the respondents had work experience of 6-10 years, followed by 30.7% who had work experience of 1-5 years. None of the respondents had more than 10 years of work experience.

4.3 Observation Results of Availability of ICT Facilities in the Selected Secondary Schools

The observation included checking whether the schools had the following ICT facilities: computer laboratory, desktop computers, projectors, internet connection, ICT laboratory personnel, and a website. The condition was that, if a school had a given ICT facility, the researcher would mark it with a tick [√] as shown in table 4.2. The first objective of this study was used to provide information regarding the availability of ICT facilities in the selected schools. Thus the results of the findings were summarized in the table below:

Table 4.2: ICT Availability in Selected Secondary Schools

School	Availability of ICT Facilities					
	Computer lab	Computers	Projectors	Internet	Lab Personnel	Website
G.S APRED NDERA	√	√	-	√	√	-
G.S KINYINYA	√	√	-	-	√	-
E.S BUMBOGO	-	√	-	-	-	-
FAWE GIRLS	√	√	-	√	√	√
G.S RUTUNGA	-	√	-	-	-	-

Source: primary data, 2018

The above results revealed that none of the five selected schools had all the ICT facilities that were listed in this study as the prerequisite for basic ICT adoption. Furthermore, none of the schools had a project and only one school had a website. In addition, only one school had at least a computer lab, computers, internet connection, a lab personnel and a website. However, all the surveyed schools had computers since they were distributed by the government to promote ICT in secondary schools at country level. However, the schools that had no laboratories, had placed the computers in the library section where the students and the teachers could easily access them. The above results imply that ICT adoption in respect to the availability of facilities is still very low and a lot is yet expected to be done.

4.4 Descriptive Statistics

This section looked at ICT adoption in terms of performance expectancy, effort expectancy, social influence and facilitating conditions. The results were presented in terms of the opinion of the respondents, that is, SA=strongly agree, A=agree, NS=not sure, D=disagree; and SD=strongly disagree.

4.4.1 Performance Expectancy of ICT Adoption by Teachers in Selected Secondary Schools in Gasabo District

This section provides the descriptive statistics of the performance expectancy of ICT adoption by teachers in selected secondary schools in Gasabo District. The results were summarized as indicated in table 4.3.

Table 4.3: Performance Expectancy of ICT Adoption by Teachers in Selected Secondary Schools in Gasabo District

Performance expectancy	SA	A	NS	D	SD	Mean	Std. Deviation
I would find ICT useful in my job.	19(25.3%)	46(61.3%)	2(2.7%)	7(9.3%)	1(1.3%)	4.00	.885
If I use ICT, I will increase my chances of getting a salary raise.	20(26.7%)	40(53.3%)	7(9.3%)	3(4%)	5(6.7%)	3.89	1.060
ICT technology enables me to accomplish my tasks more quickly.	27(36%)	30(40%)	3(4%)	12(16%)	3(4%)	3.88	1.185
Using ICT increases my productivity (i.e. communication, processing school activities).	42(56%)	1(1.3%)	0(0%)	5(6.7%)	27(36%)	3.35	1.921
Average Mean						3.92	1.043

Source: primary data, 2018

The results presented in table 4.3 revealed that majority (61.3%) of the respondents from the five schools that were assessed agreed that they would find ICT useful in their jobs (mean=4.00, Std=0.885). However, 56% of the respondents strongly agreed that using ICT increases their productivity (mean=3.35, Std=1.921). Furthermore, 53.3% of the respondents agreed that if they use ICT, it would increase their chances of receiving pay raise (mean=3.89, Std=1.185). Similarly, 40% of the respondents agreed that ICT technology enables them to accomplish their tasks more quickly.

Furthermore, the above results shows that performance expectancy of ICT adoption was assessed by the respondents as satisfactory (average mean=3.92, Std=1.043). This therefore implies that teachers expect that when the ICT is successfully adopted in their schools, they will be able to improve in their teaching jobs and thus improve on their productivity. This is because they will be able to use ICT facilities such as projectors to provide graphical or video demonstration of

their lessons to the students. This will in turn increase the attention of the students towards the subject.

4.4.2 Effort Expectancy of ICT adoption by Teachers in Selected Secondary Schools in Gasabo District, Rwanda

This section provides the descriptive statistics of the effort expectancy of CT adoption by teachers in selected secondary schools in Gasabo District, Rwanda. The results were summarized in table 4.4.

Table 4.4: Effort Expectancy of ICT adoption by Teachers in Selected Secondary Schools in Gasabo District, Rwanda

Effort Expectancy	SD	D	NS	A	SD	Mean	Std. Deviation
It would be easy for me to become skillful at using ICT.	24(32%)	42(56%)	4(5.3%)	4(5.3%)	1(1.3%)	4.12	.838
Learning how to use ICT system does not require a lot of effort	18(24%)	44(58.7%)	6(8%)	3(4%)	4(5.3%)	3.92	.983
I would find ICT easy to use in school administration.	17(22.7%)	41(54.7%)	9(12%)	7(9.3%)	1(1.3%)	3.88	.915
My interaction with the ICT system (i.e. Classroom software, projector) would be clear and understandable.	5(6.7%)	33(44%)	16(21.3%)	16(21.3%)	6(6.7%)	3.23	1.073
Average Mean						3.79	0.952

Source: primary data, 2018

The results presented in table 4.4 revealed that effort expectancy of ICT adoption was assessed by the respondents as satisfactory (average mean=3.79, Std=0.952). This was attributed to the fact that majority, 58.7% of the respondents agreed that learning how to use ICT system does not

require a lot of effort (mean=3.92, Std=0.983). Furthermore, 56% of the respondents agreed that it would be easy for them to become skillful at using ICT (mean=4.12, Std=0.838). In addition, 54% of the respondents agreed that they would find ICT easy to use in school administration (mean=3.88, Std=0.915). Similarly, 44% of the respondents agreed that their interaction with ICT would be clear and understandable (mean=3.23, Std=1.073).

The results imply that the teachers of the selected secondary schools in Gasabo district believe that using ICT facilities would not require much physical or even mental effort. This is because the ICT facilities are easy to use and one can easily become skillful in using them since they normally have guiding instructions in every step a user takes. For example, installing a projector for a class lesson needs only to receive instruction at the beginning, and then during other lessons, the teacher can easily do it alone with no problem at all. Additionally, surfing on internet when researching for more information regarding a given subject does not need much instructions before a teacher can be skillful in using such an instrumental resource.

4.4.3 Social Influence of ICT adoption by Teachers in Selected Secondary Schools in Gasabo District, Rwanda

This section provides the descriptive statistics of social influence of ICT adoption by teachers in selected secondary schools in Gasabo district, Rwanda. Table 4.5 gives the summary of the findings.

Table 4.5: Social Influence of ICT adoption by Teachers in Selected Secondary Schools in Gasabo District, Rwanda

Social Influence	SA	A	NS	D	SD	Mean	Std. Deviation
My colleagues think that I should use ICT in my class and school related work.	19(25.3%)	44(58.7%)	2(2.7%)	5(6.7%)	5(6.7%)	3.89	1.073
My colleagues are frequently using ICT for classes and school related activities.	21(28%)	34(45.3%)	12(16%)	7(9.3%)	1(1.3%)	3.81	.967
Average Mean						3.85	1.020

Source: primary data, 2018

The results presented in table 4.5 revealed that social influence of ICT adoption by teachers was assessed as satisfactory (average mean=3.89, Std=1.020). This was attributed to the fact that majority, (58.7%) of the respondents agreed that their colleagues think that they should use ICT in their class and school related work (mean=3.89, Std=1.073). In addition, 45.3% of the respondents agreed that their colleagues are frequently using ICT for classes and school related activities (mean=3.81, Std=0.967). The above results show that most of the teachers have decided to adopt ICT in their school and class activities because their colleagues are doing the same and at the same time are encouraging them to do the same.

This is because peers can have an important role within the school. They can contribute useful activities such as providing significant advice about individual performance and also discuss mutual connection. Thus perception of value of technology can be formed through signals and messages that are delivered by peers. Teachers within the school often are significantly impacted by their counterpart's encouragement and motivation and moral support from them. Basically, as social human beings, individuals within organizations also need communications and interactions with others. Specifically, they want to get advice from their colleagues when they have problems in their workplace. The importance and benefits of adoption of technological innovations within organizations reflects on the behavior of peers who are enthusiastically involved in the process of adoption of ICT innovations. That is why most teachers within schools are interested to observe their counterpart's activities and then to try to replicate what is done by their colleagues.

4.4.4 Facilitating Conditions of ICT Adoption by Teachers in Selected Secondary Schools in Gasabo District, Rwanda

This section provides the descriptive statistics of the facilitating conditions of ICT adoption by teachers in selected secondary schools in Gasabo district, Rwanda. Table 4.6 gives the summary of the findings.

Table 4.6: Facilitating Conditions of ICT Adoption by Teachers in Selected Secondary Schools in Gasabo District, Rwanda

Facilitating Conditions	SA	A	NS	D	SD	Mean	Std. Deviation
The school has enough ICT resources including hardware and software for officials and teachers.	19(25.3%)	46(61.3%)	2(2.7%)	7(9.3%)	1(1.3%)	4.00	.885
I have the knowledge to use ICT resources.	20(26.3%)	40(53.3%)	7(9.3%)	3(4%)	5(6.7%)	3.89	1.060
There is a technical team at school that provides assistance to teachers in the use of ICT.	15(20%)	0(0%)	15(20%)	42(56%)	3(4%)	2.76	1.217
Average Mean						3.55	1.054

Source: primary data, 2018

The results presented in table 4.6 revealed that that facilitating conditions of ICT adoption by teachers was assessed as satisfactory (average mean=3.89, Std=1.020). This was attributed to the fact that majority, (61.3%) of the respondents agreed that their schools have enough ICT resources including hardware and software for officials and teachers (mean=4.00, Std=0.885). However, 56% of the respondents disagreed that there is a technical team at school that provides assistance to teachers in the use of ICT (mean=2.76, STd=1.217). On the other hand, 53.3% of the respondents agreed that they have the knowledge to use ICT resources (mean=3.89, Std=1.060).

The above results show that facilitating conditions available for ICT adoption by teachers in Gasabo district is availability of the limited ICT resources and their skills level. These are

considered to be perceptions of individuals that technical and organizational infrastructure required to use and support an intended system are available and thus intention to adopt new technologies should not be an issue. Facilitating conditions represents the external constraints on intention to adopt.

4.5 The Relationship between ICT Adoption and Performance Expectancy of Teachers in Selected Secondary Schools in Gasabo District

The second objective of this study was to determine the relationship between ICT adoption and performance expectancy of teachers in selected secondary schools in Gasabo District. Table 4.7 gives the summary of the findings.

Table 4.7: The Relationship between ICT Adoption and Performance Expectancy of Teachers in Selected Secondary Schools in Gasabo District

		ICT Adoption	Performance Expectancy
ICT Adoption	Pearson Correlation	1	.011
	Sig. (2-tailed)		.853
	N	279	279
Performance Expectancy	Pearson Correlation	.011	1
	Sig. (2-tailed)	.853	
	N	279	279

The results presented in table 4.7 revealed that there is no significant relationship between ICT adoption and performance expectancy of teachers in the secondary schools of Gasabo district ($r=0.011$, $p>0.05$). This implies that ICT adoption does not influence the performance expectancy of teachers in these secondary schools. In simple terms, it implies that adopting ICT may not be useful for the teachers, since it may not increase their productivity or quicken the accomplishment of their tasks.

4.6 The Relationship between ICT Adoption and Effort Expectancy of Teachers in Selected Secondary Schools in Gasabo District, Rwanda

The third objective of this study was to determine the relationship between ICT adoption and effort expectancy of teachers in selected secondary schools in Gasabo District, Rwanda. Table 4.8 gives the summary of the findings.

Table 4.8: The Relationship between ICT Adoption and Effort Expectancy of Teachers in Selected Secondary Schools in Gasabo District, Rwanda

		ICT Adoption	Effort Expectancy
ICT Adoption	Pearson Correlation	1	.196**
	Sig. (2-tailed)		.001
	N	279	279
Effort Expectancy	Pearson Correlation	.196**	1
	Sig. (2-tailed)	.001	
	N	279	279

**. Correlation is significant at the 0.01 level (2-tailed).

The results presented in table 4.8 revealed that there is a positive and significant relationship between ICT adoption and effort expectancy of teachers in secondary schools in Gasabo district ($r=.196^{**}$, $p=0.001$). This simply implies that adopting ICT would make it much easier for the teachers to be skillful, and use it at classroom level.

4.7 The Relationship between ICT Adoption and Social Influence of Teachers in Selected Secondary Schools in Gasabo District, Rwanda

The fourth objective of this study was to determine the relationship between ICT adoption and social influence of teachers in selected secondary schools in Gasabo district, Rwanda. Table 4.9 gives the summary of the findings.

Table 4.9: The Relationship between ICT Adoption and Social Influence of Teachers in Selected Secondary Schools in Gasabo District, Rwanda

		ICT Adoption	Social Influence
ICT Adoption	Pearson Correlation	1	.195**
	Sig. (2-tailed)		.001
	N	279	279
Social Influence	Pearson Correlation	.195**	1
	Sig. (2-tailed)	.001	
	N	279	279

**. Correlation is significant at the 0.01 level (2-tailed).

The presentation in table 4.9 revealed that there is a positive and significant relationship between ICT adoption and social influence ($r=.195^{**}$, $p=0.001$). This implies that ICT adoption among the teachers is greatly influenced by the opinion of colleagues. For instance if the colleagues are actively using and proposing the use of ICT, other teachers will also prefer its adoption.

4.8 The Relationship between ICT Adoption and Facilitating Conditions of Teachers in Selected Secondary Schools in Gasabo District, Rwanda

The fifth objective of this study was to determine the relationship between ICT adoption and facilitating conditions of teachers in selected secondary schools in Gasabo district, Rwanda. Table 4.10 gives the summary of the findings.

Table 4.10: The Relationship between ICT Adoption and Facilitating Conditions of Teachers in Selected Secondary Schools in Gasabo District, Rwanda

		ICT Adoption	Facilitating Condition
ICT Adoption	Pearson Correlation	1	-.036
	Sig. (2-tailed)		.553
	N	279	279
Facilitating Condition	Pearson Correlation	-.036	1
	Sig. (2-tailed)	.553	
	N	279	279

The presentation in table 4.10 revealed that ICT adoption is negatively related to facilitating conditions ($r=-.036$, $p>0.05$). This implies that without ICT knowledge, ICT facilities or technical support team, ICT adoption can be practically impossible among the teachers.

CHAPTER FIVE

DISCUSSION OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the discussion of the study guided by the study objectives. The discussion was done by exploring the research findings relative to what other researchers in the fields that pertain to the variables have confirmed. The study was later concluded and appropriate recommendations accruing from the findings were made.

5.1 Discussions

5.1.1 ICT Facilities Available in Selected Secondary Schools in Gasabo District

The first objective of this study was to identify ICT facilities available in selected secondary schools in Gasabo district. The study revealed that ICT availability was fairly satisfactory (average mean=2.72, Std=1.103). This was attributed to the fact that several of the surveyed schools had no internet connection, no websites, and no projectors. Most of them however, had computers and though with no computer lab nor a lab personnel.

This implies that the secondary schools in Gasabo district have not yet fully adopted ICT facilities in their schools. The lack of these ICT facilities in these schools is attributed to their costliness both in acquiring and maintaining. For example a projector in Rwanda costs up to \$350, building a website goes for up to \$400 and internet connection can be done at \$700 with a maintenance fee of \$150 per month. Therefore with such prices, poor and needy public schools cannot be able to afford because they depend on government budget allocations which is only 18% contribution to the education sector. Furthermore, the government program of “one laptop per child” only distributes limited number of computers which are not commensurate to the number of students in the classroom. The available computers in most of the surveyed schools were in the ratio of one computer to five or six students (i.e. 1:5/6).

Bamidele (2006) and Ofodu (2007) point out that the various ICT facilities used in the teaching and learning process in schools include; computers, overhead projectors, optical fibres, fax machines, CD-ROM, internet, electronic notice board, slides, digital multimedia, video/VCD machine and so on. However, the authors explained that it appears some of these facilities are not sufficiently provided for teaching and learning process in the technical colleges. This might

account for why teachers are not making use of them in their teaching the secondary schools in Gasabo district.

5.1.2 The Relationship between ICT Adoption and Performance Expectancy of Teachers in Selected Secondary Schools in Gasabo District

The second objective of this study was to determine the relationship between ICT adoption and performance expectancy of teachers in selected secondary schools in Gasabo District. Table 4.7 gives the summary of the findings. The study revealed that there is no significant relationship between ICT adoption and performance expectancy of teachers in the secondary schools of Gasabo district ($r=0.011$, $p>0.05$). This implies that adopting ICT may not be useful for the teachers, since it may not increase their productivity or quicken the accomplishment of their tasks.

However, the finding of this study is inconsistent with that of Al Mulhim (2014), who suggested that perceived improvement in performance could motivate teachers to use ICT facilities more frequently. Therefore, it can be asserted that, the stronger the performance expectancy of the teacher, the greater their intention to use ICT. Furthermore, it can be argued that teachers have high and receptive attitude towards the usage of ICT and its importance to their entire and general academic purposes. In other words, they believe that ICT will be of great value to their educational advancement. Albugami and Ahmed (2015) in a similar work found that ICT is forever useful and users show great acceptance towards ICT for learning and other purposes.

5.1.3 The Relationship between ICT Adoption and Effort Expectancy of Teachers in Selected Secondary Schools in Gasabo District, Rwanda

The third objective of this study was to determine the relationship between ICT adoption and effort expectancy of teachers in selected secondary schools in Gasabo District, Rwanda. The study revealed that there is a positive and significant relationship between ICT adoption and effort expectancy of teachers in secondary schools in Gasabo district ($r=.196^{**}$, $p=0.001$). This was attributed to the fact that teachers indicated that using an ICT facility would require less effort, it would be easy to learn how to use and one would easily become skillful at using it. This implies that teachers have positive attitude towards using ICT facilities and thus they can easily integrate it in their classroom lessons when teaching. This can be important in dispensing important concepts to the students through graphical illustrations or video demonstrations.

The above results therefore indicate that ICT has proved to be easy to use and therefore teachers are highly likely to adopt the technology. However, Al Mulhim (2014) and Alhawiti (2013) have previously pointed out that lack of access to technology, lack of training and lack of time made the use of ICT in teaching much more difficult. In other words, using the computer for preparing lessons does not require a lot effort, but to use ICT in classrooms at advanced level requires some efforts for which trainings are required.

5.1.4 The Relationship between ICT Adoption and Social Influence of Teachers in Selected Secondary Schools in Gasabo District, Rwanda

The fourth objective of this study was to determine the relationship between ICT adoption and social influence of teachers in selected secondary schools in Gasabo district, Rwanda. The study revealed that there is a positive and significant relationship between ICT adoption and social influence ($r=.195^{**}$, $p=0.001$). This was attributed to the fact that colleagues highly influenced the use of ICT facilities by the teachers in their daily class and school activities. The finding of this study is in line with that of Venkatesh and Davis, (2000) who found that people may choose to perform a behavior, even if they are not themselves favorable toward the behavior or its consequences, if they believe one or more important referents think they should, and they are sufficiently motivated to comply with the referents.

On the other hand, Alshmrany and Wilkinson (2017) found that that intention to use ICT was more personal and less socially directed than actual use, perhaps a reflection of the reality of adopting a new technology if given the opportunity at this level of schooling. The relation between social influence and intention to use ICT was thus a complex one. It is possible that the participants were not more active in pursuing the use of technology because of negative social influence, while being able to appreciate the benefits of the technology if they were assisted in using it. Thus, it can be argued that social influence has a more intense relation with actual use than with intention to use the facilities.

Pynoo et al., (2011) did a cross-sectional study and found that the relationship between social influence and behavioural intention to use ICT by the teachers did not remain the same all the time (not always significant, or insignificant). It varied based on the context of the teachers. Furthermore, Talukder (2013) in his study found that adoption of ICT innovations can be well executed through excellent communication between individuals within organizations that

generate powerful synergies. That is, key persons within organizations have a significant role in influencing the performance of their colleagues through their ability to influence other members within the organization. Moreover, external pressure created by colleagues can be categorized and assumed as social influences that influence individuals' decisions to adopt ICT innovations.

5.1.5 The Relationship between ICT Adoption and Facilitating Conditions of Teachers in Selected Secondary Schools in Gasabo District, Rwanda

The fifth objective of this study was to determine the relationship between ICT adoption and facilitating conditions of teachers in selected secondary schools in Gasabo district, Rwanda. The study revealed that ICT adoption is negatively related to facilitating conditions ($r = -.036$, $p > 0.05$). This was attributed to the lack of availability of ICT resources such as computers, internet and laboratories, and the lack of skills level of the teachers in using such resources.

However, several previous studies have mixed views regarding this, Teo (2010), and Teo (2011) indicated that facilitating conditions might have influence on the adoption of new technologies, while Pynoo et al., (2011) showed that facilitating conditions had no impact on intention to use ICT by teachers, rather it affected the actual use.

Furthermore, Alshmrany and Wilkinson (2017) found that the facilitating conditions might be responsible for lower actual use of ICT by the teachers, while not influencing the intention to use ICT under the right circumstances. Thus, in general, it can be argued that poor facilitating conditions do not actually influence intention to use, but that they are responsible for lower actual use of ICT.

NiiBoi (2014) in his study found that facilitating conditions have a positive relationship with technology usage. In earlier models such as Theory of Planned Behaviour (TPB), facilitating conditions predict intention when effort expectancy is unavailable. However, in Model of PC Utilization (MPCU) and Innovation Diffusion Theory (IDT), prediction of facilitating conditions on behavioural intention is non-significant (Venkatesh et al 2003). In situations where an individual believes that support to use technology is erratic, influence on intentions to use technology will be significant. However, where the support is consistent, the facilitating conditions are expected to directly influence use behaviour.

5.2 Conclusion

Objective one

The availability of ICT facilities was limited in most of the surveyed schools in Gasabo district. The following ICT facilities were available but limited in number: computers, computer lab and internet connect. Majority of the schools did not have project, website and lab personnel.

Objective two

Performance expectancy was deemed a necessity for ICT adoption by teachers so as to enable faster finishing of class or school related tasks and improvement in teacher productivity. This implies that availability and use of ICT facilities would enable the teachers to accomplish their jobs quickly and in a short period of time. However, without ICT, teachers may be slow and unmotivated in dispensing critical knowledge to the students.

Objective three

The teachers saw ICT adoption as something that did not require a lot of effort since the ICT facilities are there to make work much easier and at the same time they are very easy to learn. This implies that adoption of ICT in schools would make teachers to use less effort in teaching, researching course assignments, and providing solutions to academic challenges.

Objective four

Social influence was noted as a factor that encourages teachers to adopt ICT in their class or school related activities. This is because teachers who see their colleagues successfully dispensing lessons using ICT would equally desire to do likewise and save too much time spent on paper work. Similarly, administrative support and directive to use ICT at school eventually forces teachers to use ICT in their school activities.

Objective five

The facilitating conditions were found to negatively influence teacher ICT adoption. This is because without facilitating conditions such as available ICT resources and skills to use the ICT, it becomes impossible for the teachers to have interest in adopting ICT.

5.3 Recommendations

There is need for the government of Rwanda to finish fast its project of distributing refurbished computers to secondary schools and embark on installing internet connections and providing the schools with other advanced ICT facilities such as projectors and laboratories. This will help solve the problem of lack of ICT facilities in Gasabo district.

There is need for the school administration to support and comprehensively train teachers to have in-depth ICT knowledge and skills which they can later transfer to their students during classroom ICT related lessons. This will help them to gain confidence and courage when delivering ICT lessons.

In addition, training should be offered to teachers on a continuous, rather than a one-off basis so that their IT knowledge is upgraded over time. It is indeed hoped that the benefits from the use of ICTs can be fully realized and optimized in teaching.

Similarly, from the results, it would appear that mechanisms need to be put in place to ensure that teachers utilize computer technology for further development and communication, and training need to be designed to increase teachers' familiarity with a wider range of ICT applications. Teachers should also be given the opportunity and encouraged to reflect on, and make decisions about their own ICT development needs on ongoing basis.

5.4 Contribution to New Knowledge

The study contributed to new knowledge when it found that availability of ICT facilities, performance expectancy, effort expectancy, social influence and facilitating conditions are the prerequisite for adoption of ICT by teachers in a secondary school setting.

5.5 Areas for Further Studies

The geographic coverage of this study was limited to only one district (i.e. Gasabo district) in Kigali province. However, Kigali province has 3 districts. There is need for future studies to include all the districts in Kigali province so as to provide comprehensive information that can lead to a solid conclusion.

Furthermore, there is need to compare the level of ICT adoption in the five different provinces of Rwanda (the country has five provinces) among public secondary schools.

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APPENDIX I: QUESTIONNAIRE

Dear respondent, I am a student of Masters of Information Technology of Kampala International University. Part of the requirement for the successfully completing of the above mentioned course is to carry out a research in my course area. My research topic is “Assessment of ICT Adoption in selected Secondary Schools in Gasabo District. You have therefore been randomly chosen as a respondent in the this study since you were deemed the best person privileged enough to be part of this study and only your cooperation in filling this questionnaire correctly will ensure the success of the study. Please feel free to give your views on the items given by answering all the questions and indicate your choice by putting a tick [√] in the checkbox before the answer you feel most appropriate, or fill in the gaps by giving reasons or information in relation to a particular question. The responses will be for academic purposes only and will be treated with utmost confidentiality. Thank you in advance.

SECTION A: Background information of the respondent

Please provide information regarding yourself by ticking the appropriate boxes.

1. What is your gender?

- a) Male ☐
- b) Female ☐

2. What is your age?

- a) 20-29 years ☐
- b) 30-39 years ☐
- c) 40-49 years ☐
- d) 50 years and above ☐

3. Educational Level

- a) Certificate
- b) Diploma
- c) Degree
- d) Masters

4. Work Experience

- a) 1-5 years
- b) 6-10 years
- c) More than 10 years

Section B: ICT facilities Adopted by secondary schools in Gasabo district

Instruction: Please rate your level of agreement or disagreement with the statements in the table using the following: 1= Strongly Disagree, 2= Disagree, 3=Not sure, 4=Agree, and 5=Strongly Agree.

#	ICT Adoption	1	2	3	4	5
A	Performance Expectancy					
1	ICT technology enables me to accomplish my tasks more quickly.					
2	Using ICT increases my productivity (i.e. communication, processing school activities).					
3	I would find ICT useful in my job.					
4	If I use ICT, I will increase my chances of getting a salary raise.					
B	Effort Expectancy					
1	My interaction with the ICT system (i.e. Classroom software, projector) would be clear and understandable.					
2	I would find ICT easy to use in school administration.					
3	Learning how to use ICT system does not require a lot of effort					
4	It would be easy for me to become skillful at using ICT.					

C	Social Influence					
1	My colleagues are frequently using ICT for classes and school related activities.					
2	My colleagues think that I should use ICT in my class and school related work.					
D	Facilitating Conditions					
1	The school has enough ICT resources including hardware and software for officials and teachers.					
2	I have the knowledge to use ICT resources.					
3	There is a technical team at school that provides assistance to teachers in the use of ICT.					

THE END

APPENDIX II: OBSERVATION CHECKLIST

Instruction: Tick [√] against each school the available ICT facility

	Availability of ICT Facilities					
School	Computer lab	Computers	Projectors	Internet	Lab Personnel	Website
G.S APRED NDERA						
G.S KINYINYA						
E.S BUMBOGO						
FAWE GIRLS						
G.S RUTUNGA						