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Investigating e-learning implementation challenges in University of Rwanda:

The case of the College of Science and Technology

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DECLARATION

I, Valentine Kwitonda, with Reg. No: 220017932 hereby declare that all the work presented in this dissertation is my own original work unless otherwise acknowledged. It has never been presented either in part or in full for publication or award of a degree in any university.

I, therefore, present it for the award of Master of Science in Information Systems (Option: E-Government) of University of Rwanda, College of Science and Technology, School of ICT.

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DEDICATION

I dedicate this work to my Family. A special feeling of gratitude to my lovely parents Bakundukize Maximilien and Mukamuzungu Dorothy for their encouraging words. My wonderful husband Nehemiah Niyitanga, my children Ghislaine Ganza and Jayden Shami for being there for me throughout the entire master's program.

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May God bless you all!

LIST OF ACRONYMS AND ABBREVIATIONS

BI: Behavioral Intention

BF: Bad Feedback

CD-ROM: Compact Disk Read Only Memory

COVID-19: Coronavirus Disease 2019 **CST:** College of Science and Technology **DVD:**

Digital Versatile Disk

EU: Ease of use

EBMIS: Educational Business Management Information

ECT: Expectation Confirmation Theory

EDPRS: Economic Development and Poverty Reduction Strategy

ELMS: Electronic Learning Management System

GF: Good Feed back

HEIs: Higher Education Institutions

ICT: Information Communication and Technology

LMS: Learning Management System

NISR: National Institute of Statistics Rwanda

ODL: Open and Distance Learning **PEOU:** Perceived Ease of Use **PU:** Perceived Usefulness

QSR: Quality Solution and Research

TAM: Technology Acceptance Model

TPC: Technology Performance Chain

TTF: Task Technology Fit

TV: Television

UNESCO: United Nations Educational, Scientific and Culture Organization

UR: University of Rwanda

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ABSTRACT

E-learning has come to be a necessity in excessive schooling establishments and is applied in high learning education at some point of the arena. This study investigates the demanding situations students face when the use of the e-learning devices, the case of college of science and technology at university of Rwanda. There are numerous demanding situations faced by teaching staffs and students all through the use of e-learning in university of Rwanda. This study focuses on challenges faced by students while they are using an e-learning program, factors that influence those challenges and strategies to overcome those challenges. This study uses interview, observation, documentation and questionnaires as data collection methods. To examine challenges in e-learning implementation, the data collection was done using Google form questionnaire and shared toward 77 students and 10 teaching staffs from university of Rwanda, college of science and technology via email and WhatsApp.

The findings display factors that influence e-learning challenges (technological factor, poverty and lack of technical support). The study highlights the technological factor as the primary challenges of e-learning within the college of science and technology at university of Rwanda. The effects additionally display that teaching staffs and students are aware about the advantages of using e-learning. They understand themselves as having a mind-set closer to e-learning. However, the primary advantages it is much less steeply priced, can be used anywhere at any time. In the end, the study reveals that having an internet connection, comprehensive training of teaching staff as well as students, and sponsor students for getting materials like laptops, tablets, and smart phones, introduce compulsory e-learning courses in the curricula for all students as the answer to overcome the demanding situations in e-learning implementation at university of Rwanda.

Key terms: online learning, high learning institutions, student's perspective

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CHAPTER 1: INTRODUCTION

1.1. Overview

Rwanda, like other growing countries suffers from the dearth of expert talents in preserving the country's progress in monetary increase and bringing all sectors of the population out of poverty by constructing certified personnel calls for political motivations, movements, and a well-functioning education platform. The government of Rwanda has year via 12 months multiplied the budget of schooling in which 2019/20, the authorities of Rwanda has allotted 310.2 billion to the education zone and as much as 278.2 in 2018/19 (P.C, 2020).

According to the report of the National Institute of Statistics, Rwanda for the period 1999 to 2019, human capital plays important role in economic growth. Mainly as an engine for improvement of the output level, but qualitative education still needs some encouragement from the government to citizens. To be engaged in the education model by building required infrastructures (P.C, 2020). Schooling as one in all deciding factors for poverty alleviation and monetary growth and therefore monetary boom is the maximum effective device for reducing poverty and improving the great of lifestyles in developing nations (DFID.G, 2008).

It is far obvious that developing nations struggled for accomplishing a better nice of training due to teachers shortage. The proposed solution to this warfare comes in the shape of e-gaining knowledge of technology check with information and verbal exchange technology for dissemination of training wherein governments believed to have a huge capacity answer so that it will meet the growing call for of training (Anderson, 2008).

Actually, e-learning is defined as "the acquisition of knowledge which takes place through electronic technology and media" (Signra., 2020). The applicability of records and verbal exchange technology (ICT) in high studying intuitions is considered as an aggressive device for enhancing educational overall performance in growing countries and Rwanda as properly. The take a look at performed in a few universities in Tanzania has found out that amongst 10 universities studied; most effective Dar es Salaam had controlled to implement e-learning of structures, whilst other universities possess minimum infrastructures that cannot assist the usage of e-mastering structures (Makokha, 2016).

It's miles apparent that the principle challenge of e-learning of in most African growing nations is to have inefficient ICT associated infrastructure along with energy, telecommunications, and computers and well-

trained employees and the principle trouble is that even the much less current bandwidth isn't always properly controlled (Richetts, 2007).

In this research project, we gift the findings from observe to analyze the challenges hindering the implementation of e-learning in university of Rwanda, college of science and technology. Knowing that scholar and lecturers' perceptions are an essential factor for e-learning to know fulfilments, they have a look at worried amassing facts from key electronic mastering stockholders in the University of Rwanda. Their perceptions and stories on what challenges excessive learning institutions face in the implementation of electronic studying.

Other paper by (Innocent, 2020) stated that inadequate applicability of e-learning is attributed to poor attitude, lack of skills among the rookies, instructors, and insufficient ICT infrastructure because the obstacles of electronic studying increase in principal African excessive intuitions. In the end, the researchthesis project will recommend possible solutions to overcome those challenges.

1. Background and motivation

1.2.1 E-learning definition

In recent decades, the use of information and communication technologies (ICT) for educational purposes has increased, and the spread of network technologies has caused e-learning practices to evolve appreciably (Singra, 2012).

E-learning is getting knowledge by utilizing electronic technologies to access to academic curriculum. There are many terms used to describe e-learning, via the internet, ranging from distance education, to automatic digital learning, online studying, net getting to know and many others. It isn't always a course added via a DVD or CD-ROM, video tape or over a TV channel. It is interactive in that you could also communicate along with your teachers, professors or other college students in your class. Sometimes it is introduced stay, in which you can “electronically” boost your hand and interact in actual time (Jabar, 2020).

Nicholson defined e-learning as a brand-new form of getting to know that makes use of the affordances of the net to deliver customized, frequently interactive, gaining knowledge of materials and applications to numerous neighborhood and distant communities of exercise (Nicholson, 2007).

E-learning has proved a few benefits as compared to standard gaining knowledge of methods. A number of them encompass how college students make themselves comfortable in following a lesson, how the

value reduced because of the elimination of travelling barriers related to the conventional lecture rooms (Usmani, 2018).

1.2.2. The integration of E-learning platforms in Rwanda education

The authorities of Rwanda, like other developing nations is facing some demanding situations associated with the trainer scarcity, very crowded schoolrooms, and absence of teacher resources like a textbook.

So advanced methods are needed to supplement traditional teaching and learning. However, virtual classrooms have proven in many countries as a durable solution that came up with alternative teaching and learning for students and teachers to engage on an academic level.

As written by Ben (Ruhinda, 2013), e-learning additionally to be carried out, it calls for excessive bandwidth for facilitating verbal exchange equipment, so the excessive cost of this bandwidth continues to be a big problem for growing countries.

For the reason that COVID-19 outbreak, online learning has come to be extra centric in people's lives. The pandemic has compelled schools, universities, and organizations to far-flung running and this booms the use of online learning (Koksal, 2020).

All through this period, kids and college students have had to depend more on their personal sources to continue learning remotely via the internet, TV or radio (Schleicher, 2020). This emergency has led to the massive closure of face-to-face activities of educational institutions in more than 190 countries including Rwanda in order to prevent the spread of the virus and mitigate its impact (ECLAC-UNESCO, 2020).

African higher education has encountered the digital divide while coping with the lockdown crisis to manage the continuation of studies. Consequently, the weaknesses in the education sector of Africa have had observed which was requiring both governments and private institutions to put efforts (Koninckx, 2021). As a result, the pandemic has forced universities to either adapt quickly to an online delivery system (Gaidi, 2020).

In Rwanda, e-learning programs have been adapted in high learning education, the program developed a platform for the attention of enhancing teaching and learning in the University of Rwanda.

Rwanda schooling operates on a 6-3-3-4 system, wherein it takes 6 years for the pupil to complete primary college research, 3 years for junior secondary faculty (ordinal degree), 3 years for senior secondary faculty (advanced degree), and four years for university bachelor degree (Mugiraneza, 2021).

1.2.3. E-learning at the University of Rwanda

The government of Rwanda acknowledges that open distance learning (ODL) is used in excessive education a good way to provide a chance to the ones who have unable to benefit from traditional high training.

According to the statistics from the high education council, high learning students enroll in a day program with the rate of 62% in 2014, evening and report program represented 36%, and students in e-learning program were approximately 2%. However, different government policies and strategic plans have recommended ODL as one of the strategies that can address the growing demand for high learning education (Mukama, 2016).

Meanwhile, UR strategic plan 2018-2025 in goal two is the quality of teaching and learning, therefore, the university has to create learning experiences for students and teaching experiences for staff. The University of Rwanda will improve the use of information technology in enhancing teaching and learning by integrating ICT tools into the learning environment across all UR campuses.

The integration of information technology, online learning has accorded the attention of enhancing teaching and learning in the University of Rwanda. Firstly, university of Rwanda has a customized e-learning platform. It is designed as a learning management system (LMS), where the instructor is able to upload their teaching materials for student's access.

During COVID-19 pandemic lockdown the statistics indicate that 90% of modules taught at UR are hosted on the UR e-learning platform, the UR e-learning platform used to record 200 to 300 users daily before COVID-19 pandemic, and the number have increased during a lockdown, where daily users reach to 27.000 Which are students and staffs.

This study targets at performing a qualitative field studies observe, wherein the researcher attempted to perceive crucial fulfillment elements and the challenges of e-learning of in immoderate mastering institutions regarding the project of studies

1.3. Problem Statement

According to (Byungura, 2015), previous systems implemented at University of Rwanda to support e-learning activities have failed because the rate of underuse or nonuse was very high. Most higher learning institutions are spotting a high growth in the wide variety of college students registering for both undergraduate and graduate programs. In Rwanda, in line with the National Institute of Statistics of Rwanda's statistical year book, the number of college students in higher training has been appreciably increasing at a rate of 58.76% from 19828 in

2008 to 33743 in 2013. This increase is not in keeping with the boom of qualified instructional academic staffs.

Previous online learning platform applied at University of Rwanda to help e-learning activities have failed because the rate of underuse or nonuse became very excessive. In short, users did no longer use these e-learning structures as intended by the university management. A recent instance was the Educational Business Management Information System (EBMIS).

This system was implemented for educational management in 2012 in the former National University of Rwanda. The economic commission of the Rwandan Parliament argues that, with the big amount invested inside the project, the EBMIS isn't effective as supposed.

Another case is the E-learning platform “e-learn @UR” which changed into built on Moodle software program. The stage of usage of this open source tool is still very low. Therefore, there are nonetheless large efforts to improve system awareness through the brand-new University of Rwanda (Byungura, 2015).

In brief, users did not use these e-learning platforms as intended by the university management. Therefore, general problem in this current research is that university of Rwanda has introduced new technology practices with online without knowing if doing, so results in enhanced student learning outcomes. Universities are under pressure to align their curriculums with nation-wide government initiatives that demand technology. UR was not lagging behind due to various challenges such as the lack of training and technical support for students, lack of access to the required infrastructure, technological devices and software.

According to (Nyiringango, 2022) for research about University of Rwanda the college of Medicine and health science preparedness to word e-learning platform, the research reported poor interactivity with students, limited internet access, inadequate hardware and software, and concern about security issues on the internet as the top five barriers to utilizing the e-learning approach.

The specific problem addressed in this qualitative case study is that students and teaching staff that are unprepared for effectively integrating technology into their lesson plan. The learners are not trained, supported and motivated to use the current UR e-learning system course design platform currently in place. And on other hand, lecturers were trained to adapt to the e-learning system course design but it does not facilitate online classes for them. Therefore, this research study proposed an e-learning model that enhances the students and teachers e-learning environment and contributes to the e-learning challenge's elimination. Moreover, this study

has the motive of investigating the challenges dealing with students in making use of e-learning in high education of Rwanda via a case study of the University of Rwanda, college of science and technology. Consequently, these challenges led e-learning implementation to fail, which might be the result of delaying the quality of education. To be able to promote the success use of e-learning platform, a closer relation between the university teaching staffs and students need to be improved. This observe is meant to prove the lecturer – student's relationship in e-learning surroundings, provide training and technical support about e-learning particularly to students, to help them to explore e-learning services, provide a quick internet connection so that they will be able to access materials, to attend class as well as to communicate between them and their teaching staffs. Therefore, this study aims to investigate the challenges that hinder e-learning implementation as well as proposing the solution to overcome those challenges.

1.4 Objectives

1.4.1. General Objective

The main objective of this study is to investigate the challenges that hinder the implementation of e-learning in university of Rwanda, highlights challenges that hinder the effective adoption of e-learning, and propose a model to fulfill the gaps identified.

1.4.2. Specific Objectives

This area of research is unexplored in university of Rwanda college of science and technology because e-learning is a new experience in all high learning institution in Rwanda.

Hence, the present paper seeks to:

- ✓ Find out why students can choose e-learning program rather than traditional learning method.
- ✓ Find out the challenges students and teachers face when they choose e-learning platform in their learning activities.
- ✓ Propose a model solution to overcome the challenges

1.4.3. Research questions

To achieve on the objectives of this research study, the following research questions were formulated:

- ✓ To what extent do students and teachers (lecturers) intend to use the current e-learning platform?
- ✓ What factors can positively and negatively influence the acceptance and use of the current e-learning platform at university of Rwanda, college of science and technology?

- ✓ What may be considered to ensure a successful implementation of e-learning platform at university of Rwanda?

1.5. Justification of the Study

The findings of this study will affect to the benefit of society, considering that e-learning plays an important role in the education sector today. The fundamental significance of this research is that, it provides deep insight knowledge of student perception towards the online program and with their view, it will be clear that what technical lacking does the university have in their online learning process which they need to cover to meet student's requirement. This research is significant to the following:

School department: This study will help them to determine the strength and weaknesses of a certain program based on the responses of research participants. It will help to determine what specific area they should focus more and further enhance in order to make the program more responsive towards preparing the students for their future professions. Thus, a school that applies the recommended approach derived from the result of this study will be able to implement e-learning successfully. University guided on what instructors should emphasize to improve students' performance in the use of the e-learning program.

Students: This will help them realize whether the knowledge, skills, and services developed in this program are useful in their academic activities. It will also encourage them to give their contribution about how eliminated. This study will also encourage them to pursue their course.

Instructors: This study will be very beneficial to the teacher because it will help them realize where they can put an effort as facilitators of eLearning program use.

This study is significant in the University of Rwanda, students, and instructors whereby it proves the role and the impact the e-learning system has played to enhance the opportunity

Future researchers: The findings of this study will serve as reference material and a guide for future researchers who wish to conduct the same experimental study or any other study related to e-learning challenges.

1.6. Scope of the Research Project

The scope of this examine is restricted to analyzing the challenges of e-learning program in University of Rwanda, college of science and technology.

The fieldwork was carried out in Rwanda excessive learning group and will consciousness solely on e-learning on the University of Rwanda. Informants can be confined to (undergraduate and postgraduate students from the college of science and technology).

This observe is, therefore, recognizes the degree to which the findings of this take a look at can generalize to other colleges based totally upon qualitative records accumulated in college of

science and technology. The below chart shows the timeline of research study

1.7. Organization of the Study

Here is an overview of the structure of the research provided. This study includes six chapters: In the first chapter, the reason for conducting this, research, and the research problem introduced. Following in chapter two, we need to explain existing literature, investigate the gaps in this literature, and how to overcome it; this chapter will provide a historical overview of e-learning, which reported challenges, e-learning key success factors, students, and lectures perspective. In chapter 3, there is a methodology of the thesis. It explains the methods that will be used in the implementation of this project. Next, the methods used to design the study, collect, and analyze the data are explained in chapter four. Resulting in the findings section of chapter five. The results from data analysis are presented. Chapter 6 makes room for the conclusion, discussion, limitations, and recommendation of the research.

Table 1: Thesis structure.

Chapter	Description
Chapter1	Chapter one introduces the study providing the back ground for the research,the research problem, the research objectives as well as the scope of the study. In addition, significances, the structures of the thesis and the summary of the research process was provided
Chapter2	Chapter two reviews literature by identifying and justifying the key determinants of e-learning challenge investigation. This chapter will provide a historical overview of e learning, which reported challenges, e-learning key success factors, students, and lectures perspective. The study then uses Khan (Khan, 2010), e-learning frame work to assess if they have any gaps before conceptual frame work is presented
Chapter3	Chapter three addresses the methodology, it explains the methods used in the implementation of this project. It explains research philosophy to target population, sample size and data collection instruments. The chapter explains how data was collected, prepared and analyzed.
Chapter 4	Chapter four shows discussions and the results of the study.
Chapter5	This chapter deals with conclusion and recommendation of the research project.

The structure of the thesis was done based on the five chapters of the study and is summarized in table 1.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The literature evaluated will share the result of different researches associated with demanding situations of e-learning implementation in high learning institutions. This evaluation will make the attention on e-learning integration for growing international locations, and qualitative analysis will be conducted to pinpoint problems that may prevent its hit implementation, formerly determined issues are regarded as follows:

2.2 E-learning challenges

Experience has shown that countries in the world adopt different strategies in order to increase access to high education through open distance teaching (Mukama E. 2016).

Few kinds of research have examined the experience of teachers dealing with e-learning, where it indicates that the introduction of that technology in education encountered many challenges even in developed countries. When the required technology is put into place in Liberia, students who may not have the ability to be a part of traditional classes can often consider taking online classes, they will not have to go through the difficult job of getting on to a campus. Besides this, some students will have delighted to work from home, limiting the need to travel, which will save both time and money (Jr, 2014).

2.2.1. Contextual challenges

Nowadays, information technology has emerged as a need for companies not only effective to gain aggressive benefit but also to survive. Strategic use of new educational technologies can decorate the learning and teaching process. In order to live possible on these extreme aggressive surroundings, providers of education and trainings have evolved great and effective mastering surroundings, known as e-learning. However, with the success, there also exist barriers containing the cultural aspects of the organizations throughout the implementation process (Basit, 2010).

(Ja'ashan, 2020) stated that technical skills could cause frustration to e-learning students due to unconventional e-learning environment and isolation from others. Consequently, having to learn new technologies may be a barrier or disadvantage in e-learning for ICT novices. Many academics have had no training and no experience about the use of information and communication technology as an educational tool. The Open University in Tanzania has been involved in developing e-learning wherein the 2006/2007.

E-learning management system started to be used. During that time staff training about how to use this system, they gave the orientation about how instructors could redesign traditional

courses for e-learning delivery.

They have also installed internet facilities in university centers with high internet connectivity and a high number of provision internet in many areas, despite all effort e-learning management system are not used by many academic staffs. This study found lack of training, support, and infrastructure was challenging which prevent them to not use ELMS out (Bhalalusesa, R., Lukwaro, E. E. A., & Clemence, M., 2013).

Consequently, (Ja'ashan, 2020) inspects the demanding situations hindering the implementation of e-learning in Saudi Arabia universities. It also emerged that the implementation of E-gaining knowledge of in Saudi Arabia face a few challenges, Saudi Arabia, like other growing nations records and conversation generation is presently used in training to help college students in studying more efficiently, and it facilitates instructors to adopt administration extra efficiently

This take a look at refers back to the case of e-learning for learning English inside the college of Bisha where the implementation of this system provides several challenges classified in three categories, which include educational, technological, and administrative. In addition, the study argues that most people of Saudi universities along with Bisha College already use electronic gaining knowledge of but commonly in the blended model to accumulate with face-to-face mode. (Al-Harbi, K. A. S., 2011), in his observe about the capability and demanding situations of e-learning in Saudi tertiary training. He cited that investment in infrastructure, staff IT training and development are not enough to make certain the fulfillment of E-studying use. This take a look at has investigated the elements that have an effect on e-learning recognition in Saudi universities and the most highlighted are college students' attitude towards e-learning, the impact of human beings around them, and perceived e-studying accessibility, which are challenges for e-learning implementation referred to in many studies.

In step with (Bwire, 2020) investigation, ICT integration in Uganda education nevertheless has much stuff performed before figuring out the overall potential use of online learning. Their research determined that negative net connectivity, no dependable energy supply, and teacher lacked required capabilities for designing online guides as the primary demanding situations that prevent the huge adoption of online learning in universities in Uganda.

(Al-Adwan, 2013) argued that Technology Acceptance Model as the most suitable model to explore the user acceptance of e-learning in Jordan. They also reveal that the main mechanisms underlying perceived use are system design and features.

(Al-Omari, 2009), found that Jordanian students recognized the potential of e-learning platform to support the data gathering for teaching and learning. They were uncomfortable and unsatisfied with the learning environment provided. (e.g. practiced low interactions with the features of the interface created, low student–student relationships, low student–teacher relationships and low student–media interaction). He also reveals that the reflection activities and technology competence for male participants were higher than female participants.

2.2.2. Technological challenge

Online learning is the instructional utilization of technological devices, equipment and internet. The availability of internet and the cost of internet package determine the continuity of e-learning. However, this study found that students experienced limited internet access because of limited finances with which to buy internet packages. The paper (Tarus, 2015) investigated the challenges hindering the implementation of e-learning in Kenya public universities.

For online course to happen, the combination of internet connection and smart devices such as laptops and smart phones. It is mandatory considering the availability of all those aspects before implementing e-learning.

As the use of ICT for distance education, make access to the technology, but this access also refers to the quality of connectivity. The solidarity of this connection and bandwidth will affect the user's ability to access the full content of as need. Anderson (A., 2008) during his research he found that students from rural area do not have IT at all, due to the lack of infrastructures such as electricity. He also mentioned that those who get internet, the speed is very low, which is also the major bottleneck. The thing is also that not everyone has internet at home, meaning that it requires him or her to spend a lot of money to buy internet bundles.

According to (Islam, 2015), e-learning requires a different approach to pedagogy especially in the area where there is individual and group interaction and online assessment they argue that, despite wide spreading e-learning, it is not technically equipped to handle development of materials and online modules are hindering progress, and they require extensive skills' development.

Technical support to academics is lacking comparing to the desired e-learning success and the extreme use of technology. The greatest demand met with insufficient investment in infrastructure and technical assistance.

Pedagogical and socio-economic forces that have driven the higher learning institutions to adopt and incorporate ICT in teaching and learning include greater information access,

greater communication, synchronous and asynchronous learning, increase cooperation and collaboration, cost –effectiveness and pedagogical improvement. However, ICT has not permeated largely in much higher learning institution inmost developing countries due to many socio-economic and technological circumstances.

Chita nana (Chitanana, 2012), reveals that universities of Zimbabwe are under pressure of providing reliable internet access to students and lecturers. According to him, the popularity and use usage of heavybandwidth consuming applications grows. The number of network users multiplies the need for a concerted and coordinated effort to monitor bandwidth utilization and implementation of effectivebandwidth management strategies become increasingly important to ensure excellent service provision.

As the popularity and usage of heavy bandwidth consuming applications grows and the number of networkusers multiplies, the need for a concerted and coordinated effort to monitor bandwidth utilization and implementation of effective bandwidth management strategies becomes increasingly important to ensure excellent service provision

According to this paper (Tagoe, 2012), after his investigation about students' perceptions on incorporating e-learning into teaching and learning at university of Ghana he found that e-learning depends on three critical factors. These are computer ownership, prior experience and perception of students about e- learning. He also found that female students' own computers than male students; while male students havehigh frequency of using internet than female.

The challenge of technology is also found in Rwanda, where there is still a recognizable lack of IT supported systems for teaching and learning activities (Sanga, 2007). Furthermore, e-learning systems have been implemented some years ago in higher education but a number of them failed to produce the expected technological results (Guri-Rosenblit, 2005). And also (Mugiraneza J. P., 2021), claimed that an examination of various policies, strategies, and frameworks reveal that the Rwandan educational systemhas undergone changes that call for instructors to adopt better methods. But there are still issues with regard to the caliber of instruction, which are made worse by severe shortages in acceptable facilities, shoddy ICT infrastructure, and a lack of possibilities for appropriate training and professional growth. Rwanda is aware that the transition to a knowledge-based economy would necessitate the growth of technological and scientific expertise at all educational levels. The Education Sector Strategic Plan (ESSP)2018/19-2023/24 stipulates that it will also be necessary to equip teachers with a supportive work environment that enables them to embrace and teach twenty-first

century skills.

2.2.3. Course design challenges

As mentioned by (Allen, 2011), e-learning course need to have a logical structure and includes comprehensible graphics and analogies, as well as appropriate methods and procedures to evaluate the progress of your learners.

According to (Wang, 2000), the course designers /instructors need more professional training to improve the quality of user-friendly and visual effects and usage of information and communication technology, there is a need to research on good practices of designing and facilitating online collaborative meaning

In developing countries, the research reported that teachers' lack of technological competence is a main barrier to their acceptance and adoption of ICT. According to (Tarus, 2015), implementation of e-learning is still at the infancy stage in most Kenyan public universities due to many challenges related to implantation.

These challenges range from technological, organizational and pedagogical challenges. Universities should be prepared to respond to the challenges raised during course implementation. Many related works reveal that developing countries still face some challenges in e-learning implementation; according to them, this project requires advanced level technological infrastructure and heavy investment of resources, and they argue that poverty is the most barrier because ICT is important but more expensive in Africa compared with developed countries. E-learning has many challenges such as technological, course design and conceptual.

In recent years, there has been an increasing adoption of learning management system (LMS) facilitated e-learning in higher education institutions (HEIs) in developing nations. Despite the perceived benefits connected to e-learning, numerous studies concur that there are nevertheless many challenges going through e-learning.

These include but are not limited to course development, assessment, learner support, institutional factors, user characteristics and overall performance (Hadullo, 2017).

In summary, the reviewed varieties of literature recognized the usage of e-learning incorporated into universities education as a brand-new version to growth get right of entry to open distance mastering (Mukama E. , 2016). (Tarus, 2015), found out that they nonetheless have many challenges to conquer at the same time as enforcing learning in growing countries, E-learning tends to fail in many countries due to numerous limitations. (Bhalalusesa, R., Lukwaro, E. E.

A., & Clemence, M., 2013) identified lack of team of workers' education, guide, and infrastructure as one task that can save you electronic studying achievement. In Rwanda, in line with (Ruhinda, 2013), the best of internet capability is the foremost issue that influences the adoption and the use of e-learning.

2.3 Research Gap

The review of the researchers on the e-learning showed that globally, e-learning has grown in importance as an academic tool, just like technology has developed and improved over the years. Even if there is a technological development for e-learning, there are still some challenges, based on the results of the literature review, we tried to group those challenges in three ways such as technological, course design and contextual ones.

In addition, recent studies have shown that ELMS is less successful than a conventional method, particularly in developing countries like Rwanda. This is attributed to ELMS which includes certain disadvantages, such as lack of involvement, cooperation and lack of face-to-face interaction, Strong e- skills, technical facilities, computer and internet connection are also required. The gap between students and lecturers was also increased (Yousef, 2022).

All the considered papers have tried to expose that the implementation of e-learning is going through challenges, but they did not tell to conquer them. Therefore, the state targets of this study are to discover the factors that may influence the challenges the university of Rwanda face at the same time as implementing an e-learning, to know gadget as well as recommend an answer to triumph over the ones demanding situations. Based totally on a research problem, research question, and literature overview, a theoretical framework has to be developed. The University of Rwanda is going through demanding situations in e-learning implementation, therefore improving trainings, support, and infrastructures can play critical position in reaching e-learning fulfillment.

2.4 E-learning system models

2.4.1 Technology Acceptance Model (TAM)

According to the paper written by (Tawafak, 2021), parameters of smoothness of using technology can indicate social influence pointing to the way of communication and information knowledge progress between students using the TAM model. The previous models on TAM consist of initial acceptance and satisfaction as outcome factors.

In order to assess if technology would be welcomed, embraced, and used, the Technology Acceptance Model was developed by Davis (Zaineldeen, 2020). TAM has a goal to assist academics and experts in determining if a certain technology is desirable or undesirable and to

conduct suitable actions through description, similarly to forecasting.

The model is considered one of the most referenced models in acceptance of technology (Rabie, 2022).

TAM is the most prevalent model adapted, which was originally presented by Davis (Fred D. Davis, 1980) and further developed by him and other researchers (Goodrum, 2016). Many scientific frameworks were used to apprehend the integration of technology. Among the frameworks, TAM has been the maximum broadly-used and reported model in the social science context.

The TAM defines that the attitude; people's feeling, positive or negative, regarding the behavioral intention performance towards adopting a system is predicted by their perceived usefulness and perceived ease of use (Sukendro, 2020). In the unique theory principle of TAM, perceived ease of use is likewise reported predicting perceived usefulness. Besides, behavioral intention (the degree to which people perform or not perform for specific future behavior) to adopt a system is predicted by the attitude and perceived usefulness. Finally, the actual use that is described as the use of a system is predicted by behavioral intention (Zaineldeen, 2020).

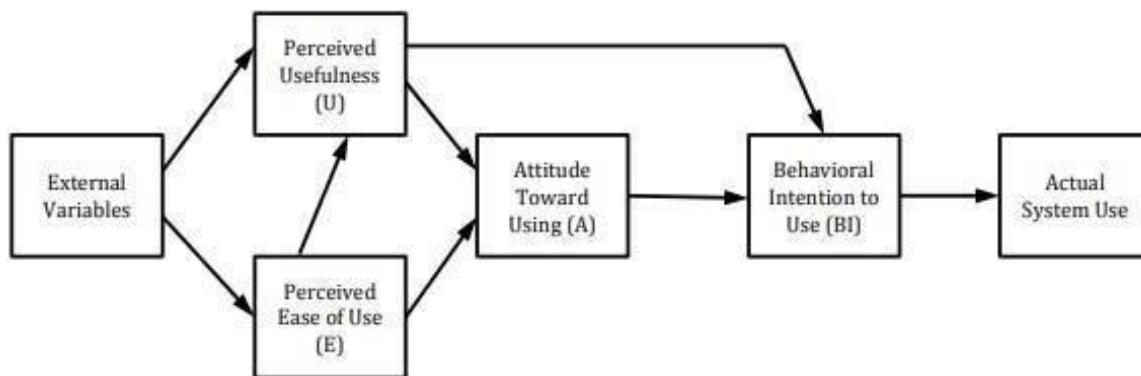


Figure 1: Technology Acceptance Model (TAM) From Davis, 1989

2.4.2. Expectation-Confirmation Theory (ECT)

The ECT concept theory was also combined in this thesis via the elements of usefulness, happiness, and consistent use perceived.

The peer support factor refers to the type of confirmation that could be predicted from peers to peer discussion on the student's activities, and also look for support by sharing knowledge between students. Teacher support refers to the link and conversation between the teacher and students to explain the material and discuss assessment feedback.

TAM is, in its essence, a theoretical and cross-sectional model that predicts information system

acceptance based on user perceptions. However, post-adoption behavior that arises out of users' direct first-hand experience with the target information system, are not explicitly included in TAM. Expectations-confirmation theory (ECT), on the other hand, presents a different perspective on information system continuance (Bhattacharjee, 2001).

ECT posits that initial pre-usage expectations, coupled with perceived overall performance, result in post-adoption satisfaction, which in turn determines the formation of the reason to keep the use of the artifact under consideration. This effect is mediated via wonderful or poor affirmation between the expectancies and the perceived overall performance. If an artifact outperforms expectancies (positive confirmation), post-adoption satisfaction will result. If an artifact falls short of expectations (negative affirmation) the user is likely to be upset.

Perceived performance is regularly conceptualized as individual ideals approximately the usage of the artifact (Bhattacharjee, 2001).. As a meta-analysis of TAM studies shows, perceived usefulness is the only salient belief that has consistently been demonstrated to influence user intentions across several stages of information system use. Accordingly, perceived performance in the original ECT has in the information system context repeatedly been conceptualized as PU.

For instance, it has been discovered that satisfaction is influenced by perceived usefulness and the confirmation of expectation from prior data gadget use (Bhattacharjee, 2001).

Expectations reflect anticipated conduct. In a post-adoption setting, the concept of preliminary expectancies bears little merit to a study. Pre-usage expectation is normally based totally on others' opinions or information disseminated through mass media. What is greater of interest to a study of post-adoption behavior is regardless of whether the preliminary expectations are confirmed through preliminary and continued exploitation of the artifact, and whether this would result in satisfaction. Hence, expectation as a construct has regularly been excluded from ECT models. ECT offers a perspective on procedure of modeling technique continuance different to that of TAM in that it focuses greater on external factors, inclusive of pre-utilization expectations. As organizations traditionally exhibit a great deal of manage over pre-utilization conditions in process modeling (for instance, the initial selection of a technique, its market penetration, communiqué through social channels, facilitating assets consisting of tool assist and training capacities), it would appear workable that it's important to develop an understanding of ways the positive affirmation of such expectancies toward a technique modeling technique might lead to a satisfying use of the technique and how the satisfaction in

turn could have an effect on the continuance intention.

2.4.3. Technology Performance Chain (TPC)

Goodhue and Thompson (1995), recognizing an important missing dimension in their model, expanded TTF to the Technology Productivity Chain (TPC) (see Figure 2 below), combining the original TTF model with theories of attitudes and behavior that focus on utilization; the researchers assert the new model is now consistent with the D&M IS Success model “in that both utilization and user attitudes about the technology lead to individual performance impacts” while retaining the TTF construct which is either missing or assumed in other models.

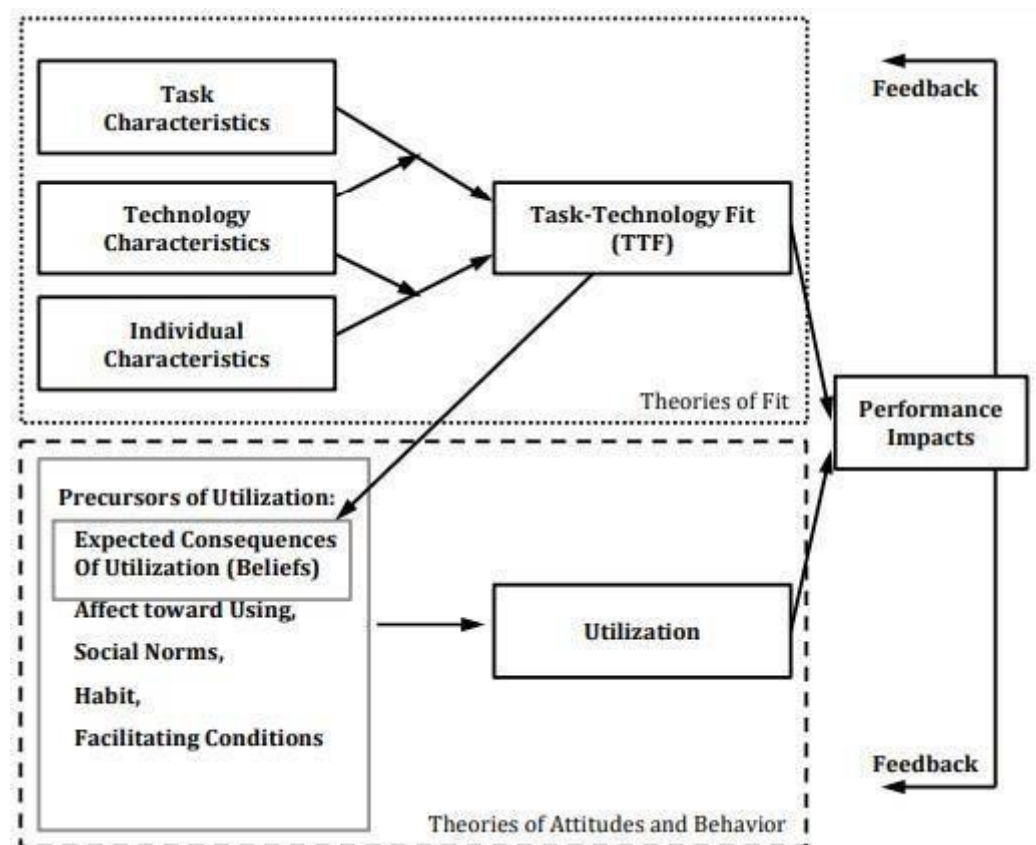


Figure 2: Technology Performance Chain (TPC)(Good hue and Thompson,1995)

2.4.4. Multi-e-learning models

Multi-E-learning models are the technology that combines more than one model to form one system. Each model brings its factors to make the e-learning platform effective and give a good result for both learners and teachers. Previous studies have shown the model factors for course content to improve an e-learning model. Also, another study by Hone, in which the model justified the factors, course content, and effectiveness that significantly influence the

continuity of outstanding work. Therefore, their studies targeted the regression of content and usefulness to teachers and students' benefit more than focusing on continuous intention to use the e-learning process (Ashfaq, 2021).

Each step is crucial to react to those instructions. In the first step, e-learning is based on the continuous intent to inspire students as active users using the e-learning platform. The second step involves teachers' teaching techniques in the material offered by the courses and the experience of teachers in the use of integration of teaching technology and assessment towards the continued use of the e-learning process. Also, the level of satisfaction acquired from students with the framework is confirmed. The e-learning framework helps teachers increase student comprehension, peer debate, enhance information sharing and the growth of skills (Alfarsi, 2021) and explain how to boost technology outputs to face main challenges. Conversely, other studies improve student learning on internal and external variables such as course materials.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This section details the research area, the university of Rwanda e-learning platform and the proposed e- learning model for university of Rwanda, research population, sampling design, sampling techniques, sample size, research methods, data collection and analysis tools used in the thesis.

Kothari defined the research methodology as a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically (Kothari, 2004).

3.2 Research area

The case study of this thesis is university of Rwanda, college of Science and Technology. The College of Science and Technology (CST) turned into established via the Government of Rwanda regulation N° 71/2013 of 10/09/2013 setting up the university of Rwanda (UR) and figuring out its mission, powers, organization and functioning as a technology specialized university for teaching and training of highly skilled employees inside the fields of pure and implemented sciences and engineering to rapid track countrywide development.

In line with the Government's dedication to achieve the dreams and targets truly, set out with inside the country's EDPRS 2 and the Vision 2020, the college of science and technology (CST) is one of the six specialized colleges that are under the university of Rwanda, therefore plays a key role in teaching and research, reaching out to the community and supporting the private sector with highly skilled labor.

CST has 5 schools such as School of Information and Communication Technology, School of Architecture and Built Environment-SABE, School of Sciences, School of Mining and Geology, School of Engineering.

3.3 Research methods

Considering general purpose of this research, which investigates the experience of e-learning challenges, the work defined on this paper finished on the college of Rwanda in 2021. The intention of this look at became to research the demanding situations hindering the e-learning to know implementation university of Rwanda. This take a look act is methodology deliberate to observe a qualitative research strategy.

The chosen method manner that a qualitative inquiry approach deliberates of being accompanied inside the design and circumstance of the study. Qualitative investigation outcomes in statistics containing words, testimonies, observations, and files that show the issues and subject of the take a look at. Following are three strategies of records: collection in a

qualitative way: intensity open-ended interview is the technique of gathering statistics on individual's non-public histories, perceptions, and reports particularly when touchy topics are being explored (Marc, 2005). The open-ended questions examined for in-intensity data-rich answers that can describe interviewees and those information, feelings, perceptions, experiences, and evaluations. observation and fieldwork are appropriate in amassing information on naturally taking place in their traditional contexts this approach focus on and recognition on observations and fieldwork, description of movements, conversations, behaviors, interpersonal interactions, organizational system, and the entirety are documented in discipline observe and reflective journals.

Files consist of social media postings, reliable guides and reports, photographs, and different written materials and documentation from organizational packages and statistics (Lacking, 2017). This observes used a combination of all those techniques elaborated. Orienteering and contrast among statistics from exclusive techniques will contribute to a deep expertise of the consequences of findings. (McCombes, 2020) factors out that in a qualitative take a look at, the researcher can use the outcomes received from the pattern to generalize about the whole populace, and he also revealed that non-opportunity sampling techniques are used in qualitative studies.

Case study studies is more appropriate for this study, it brings a researcher to recognize complex troubles via contextual analysis of confined conditions and their relationships. The case observes research design also can make bigger than enjoy to what is already recognized through previous studies (Kirshenblatt, 2006). This take a look at also worried the gathering of qualitative statistics by way of a various number of respondents by interviewing and questionnaires to a pattern of individuals.

3.4 Population

The population is the group of interest and for whom the results will be applicable. The population needs to be defined in fairly formal and precise terms so that it is clear who falls within your definition and who falls outside of it (Antony Arthur, Beverley Hancock, 2009).

Particularly for comparative surveys, it is vital that a clear understanding of the target population is reached well in advance of commencing survey fieldwork. Surveys are complex, challenging and expensive activities. Without a clear target population, resources will likely be wasted (Murphy, 2016) for that reason, this research thesis is focused only on students and lecturers of university of Rwanda college of science and technology.

3.5 Study sample (targeted group)

There are various approaches for determining a sample; probability sampling and nonprobability sampling (Denscombe, 2010). Probability sampling includes randomization, systematization, clustering, multi-staging and stratification of the sample. This approach is characterized by the principle of randomness when selecting the sample and it posits that, there should be no influence of the researcher on the people or objects to be included in the sample. On the other hand, non-probability sampling does not consider the random selection of the sample. This sampling approach includes quota sampling based on strata, convenient sampling, snowball sampling where a researcher is referred to other optional participants, theoretical sampling aiming at theory development and finally purposive sampling that focuses on deliberately selecting a relatively small number of people or objects. In this thesis, the population, in which to get a reachable sample, is composed of teachers and e-learning projects coordinators from the University of Rwanda. Sample is a portion of a population or universe. However, by population, many often consider to people only. Population does not necessarily mean a number of people. It can also refer to total quantity of the things or cases which are the subject of the research (Ilker Etikan, 2016). Probability sampling specifies to the researcher that each segment of a known population will be represented in the sample. Probability samples lend themselves to rigorous analysis to determine the likelihood and possibility of bias and error. Random selection is the process of choosing the components of a sample that ensures each member of a population stands the same chance of selection. The characteristics of the sample are assumed to be similar to the characteristics of the total population it is drawn from (Adwok, 2015). Therefore, this study employed stratified and purposive sampling techniques. Purposive sampling technique was used to get the respondents representing one of staffs and Students from University of Rwanda while stratified sampling technique was used to get the respondents of which were attained using Yamane formula (Singh, 2014).

Potential participants and inclusion criteria: potential participants of this research include graduate (master's degree) and undergraduate students (bachelor degree) and some small number of teaching staff. The study sample includes 87 participants (N=87), 77 students were selected as key participants to explore the student's experience of e-learning challenges in university of Rwanda. This research attends to explore student's perspective about e-learning challenges; ten teaching staff was chosen to participate in this research. Since the participants of this study were students from university of Rwanda, the inclusion criteria were set as being a current student or a teaching staff in college of science and technology and the participant's

agreements to collaborate with this study.

3.6 Data collection

The data were collected using the following methods: Interviews, observation and questionnaires. Data were collected through a questionnaire that consists of two parts. Part one, which is questionnaire 1, consists of 9 open ended questions reserved for students, while the second part (questionnaire 2) consists of 12 open ended questions reserved for teaching staffs. Statistics changed into assembled through administering a dependent questionnaire with open ended questions to college students and lecturers.

The objects of the questionnaire had been organized after searching critically on the literature overview related to this field. The questionnaire is categorized in step with students' reveal in with e-learning compared to traditional getting to know, the challenges they meet in the eLearning application, and their recommendations to overcome the challenges. The questionnaire was shared to participants via email; the link was sent to them on their emails and WhatsApp.

Observation: Evaluation Research Team (2008), defined observation as a way of gathering information by watching, behavior, events or nothing-physical characteristics in their natural setting. As postgraduate student in University, I have been observing how we proceed our studies online since lock down due to COVID 19.

During the process of observation notes that include participant study habits have been taken, description of the physical environments where participants were studying and how participant were actively involved in her /his online learning class.

Documentation: Fraenkel and Wallen (2003) indicated that documents refers to any kind of information that exists in type of written or printed for private or public consumption public and are available to the research for analysis. Thus, UR e-learning platform have been reviewed, participant mails message and participant submitted assignments. Others documents

3.7 Data analysis

Data analysis is the key of qualitative research. Data collected from interview was exported from Google form to excel document, before imported into NVivo software for analysis. The data were organized around each research questions, which related to experiences of student who were taking online classes, same teaching staffs and the factors that shaped those experiences.

The researcher examined the interview, observation and archival data for similarities and

differences. This research concentrates on negative experience about online education.

The negative experience includes delay instructor feedback, unavailable technical support from instructors, and lack of motivation, poor internet connectivity and lack of required materials, lack of interpersonal communication and poor designed course interface. Limitation of the analysis was reported and discussed in the findings of this study. Data collection and analysis provided the answer to the following questions.

1. What demanding situations does the University of Rwanda face that avert the hit implementation of e studying?
2. What are your advocacies for addressing those demanding situations?

Moreover, documentary evaluation is taken into consideration in statistics series. Secondary statistics turned into accumulated thru document evaluation from college reports Strategic plans, authorities' files, and applicable journals and papers of in advance research.

The records collected from the questionnaire were analyzed qualitatively with the aid of categorizing and coding, n-Vivo changed into used to examine data. N-Vivo is a software program application produced by way of QSR international in July 2014, it is used for qualitative and combined research techniques for the evaluation of unstructured textual content, audio, video, and photograph statistics, including interviews, awareness businesses, surveys, social media, and magazine articles (Kristin., 2021).

3.8 Instruments

Tools used in our research thesis are books, reports, papers, tools and software application.

All these materials helped us to make the conceptual and theoretical framework of our work as well as to analyze the data and interpret the results. Two types of **questionnaires** were sent to the participants in order to collect information related to this research. The first questionnaire consisting of nine questions was sent to the students in order to ask how they perceive eLearning, the obstacles in eLearning and what can be done to solve them. The second questionnaire consisting of twelve questions was sent to a number of teaching staff in order to understand what their opinion as. For collection of data, the observation technique is used **observation** was also used in this research study as a master's student and one of the students who continued to study during COVID 19, there were obstacles that I and my friends were facing, so that is one of the reasons why I did this research. In collecting information related to this research, I also used various books and articles written on eLearning, especially for universities located in developing countries. After that, I analyzed the collected data using **Microsoft Excel** and the software used in qualitative research analysis called **NVivo** because this research was also going to investigate the situation of e-learning. **Then At the end the**

Technology Acceptance Model (TAM), Technology Performance Chain (TPC), Expectation-Confirmation Theory (ECT), were used as tools to help us design a proposed model that can help the university in solving problems in e-learning

CHAPTER 4: RESEARCH RESULTS AND DISCUSSIONS

4.1. Overview

This phase gives the consequences and discusses the findings. The information is accrued through the questionnaires. The questions in the Google form were shared with members through emails and WhatsApp. The respondent answers the questions online, the respondents acknowledged several challenges they face in using e-learning.

This aimed to show in detail how the data was analyzed. Therefore, the next step was to upload data into N-vivo. The data was collected in the Google form and imported to desktop as an Excel document, then from desktop to N-vivo. The questionnaire contains two parts, one for students and the other for lecturer or university staff.

4.2 Demographic data

As mentioned in research methodology section, the data were collected using the interviews, observation and documents. Data were collected through a questionnaire that consists of two parts. Part one consisted of 9 open ended questions reserved for students, while the second part consisted of 12 open ended questions reserved for teaching staffs. This research targeted in a total of 87 respondents including 77 students and 10 teaching staff.

4.2.1. Analysis of students' responses

According to the analyzed data collected and the result from the students, students were not prepared for the sudden shift to exclusively online learning and teaching. The table below shows the details of responses from the students (N=77) where we have classified responses from 9 open ended questions into two categories: Good feedbacks (GF) and Bad feedbacks (BF) on the use of the current e-learning platform in the university of Rwanda, college of science and technology.

Variables	Group	N	GF	BF	Percentage	
					GF	BF
Questionnaires	Mastersstudents	24	5	19	20.83%	79.16%
	Bachelorstudents	53	6	47	11.32%	88.67%

Table 2: Analysis of students' responses

From the table 2, the number of master's students who responded bad feedbacks to the use of current e- learning platform in the University of Rwanda is higher than that who responded good feedbacks. This situation also was visualized for the bachelor's students.

79.16% of the master's student respondents complained that they frequently and very frequently encountered technical problems with the platforms provided by the universities (connecting to the platform, signal loss, delayed viewing of messages, the sound was not clear).

On other hand, also 88.67% of group of bachelor's students were complaining for it.

4.2.2. Analysis of staff teaching responses

Even if lecturers were trained to use the current e-learning and teaching platform in the University of Rwanda, college of science and technology, there are some challenges they still facing with. The table below shows the details of responses from the teaching staff(N=10) where we have classified responses from 12 open ended questions into two categories: Good feedbacks (GF) and Bad feedbacks (BF) on the use of the current e-learning and teaching platform in the university of Rwanda, college of science and technology.

Variables	Group	NGF		BF	Percentage	
					GF	BF
Questionnaires	Mastersteaching staff	4	1		325%	75%
	Bachelor teaching staff	6	1		516.66%	83.33%

Table 3: Analysis of teaching staff responses

The table 3 shows that, the number of master's teaching staff who responded bad feedbacks to the use of current e-learning platform in the University of Rwanda is higher than that of who responded good feedbacks. This situation also was visualized for the bachelor's teaching staff. 75% of the master's teaching staff respondents are complaining that they frequently facing some challenges while using e- learning and teaching platform provided by the University of Rwanda. On other side, also 83.33% of group of bachelor teaching staff was complaining for it. It is noteworthy that the majority of respondents are undergraduate and postgraduate college

students, a few university staff responded. On the subject of gender, the highest wide variety of respondents are male, wherein they cowl 54% and 46% are woman. However, this has an influence at the finding of this study. For instance, maximum of these college studentshas been extraordinarily new inside the college studying new structures and being familiarized with the surroundings. They have a look at sought to establish the demanding situations skilled by way of college inexperienced persons and college sorts of staff when the usage of e-learning, so the following major topicsnamed name emerged as captured in table 5.

4.3 Results presentation

This section presents the results obtained from data analysis into table 2 and 3 above.

4.3.1. Masters' students result presentation

The figure below presents the masters students responses that includes both good and bad Feedbacks

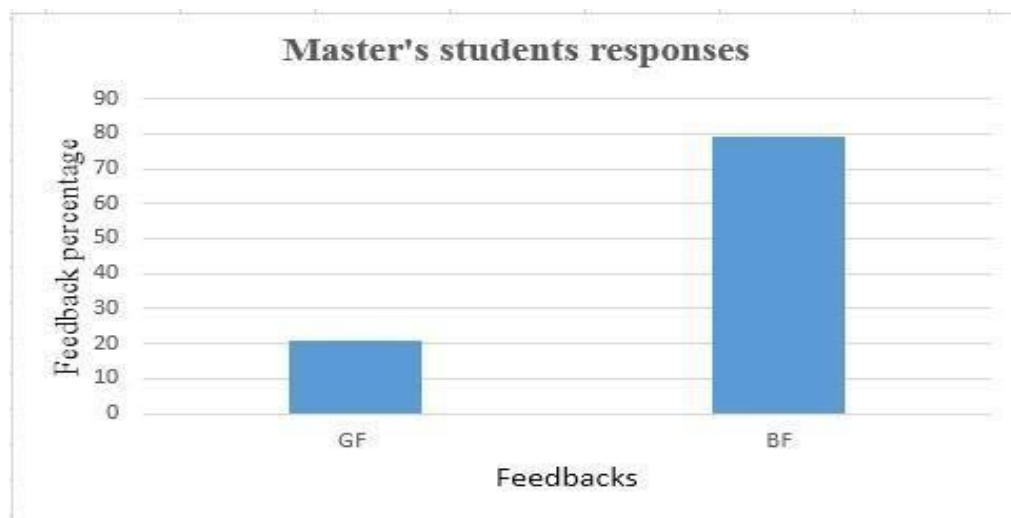


Figure 3: Master's students' responses

The graphical representation of master's student responses shows that the feedback percentage of bad feedback (79.16%) is a long bar when compared to the bar of the feedback percentage of good feedback (20.83%). This means that most of the master's students in the University of Rwanda are not happy with the e-learning and teaching platform implemented.

4.3.2. Bachelor's students result presentation

Below, there is a figure that presents the bachelor's students responses that includes both good and bad feedbacks.

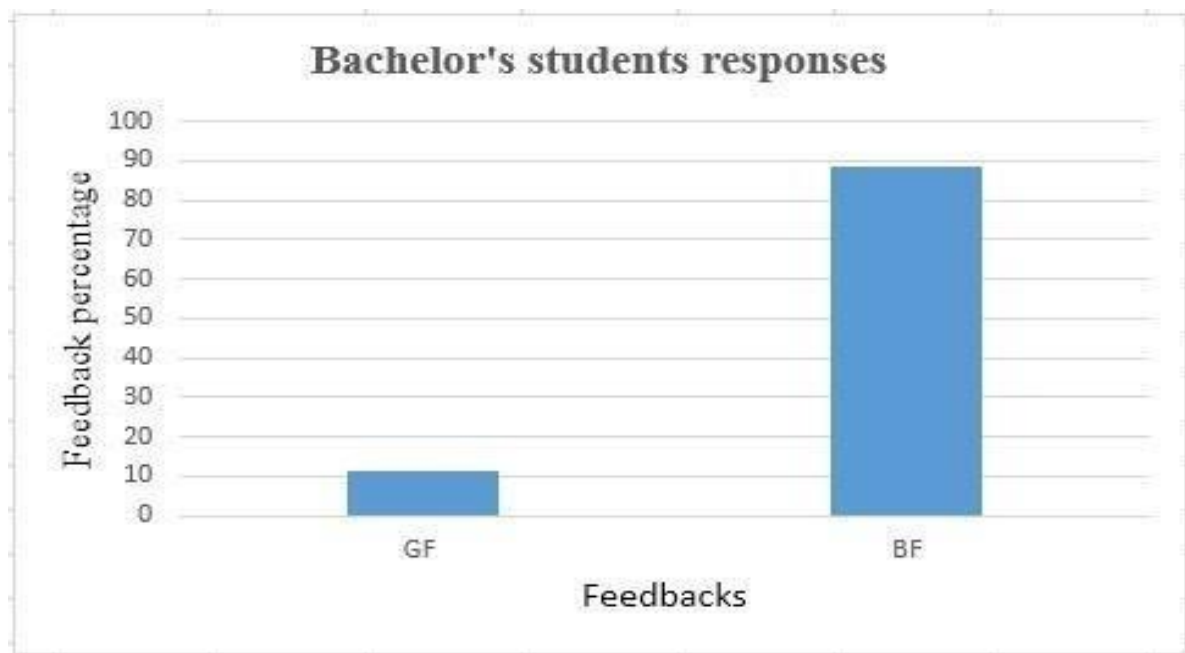


Figure 4: Bachelor's students' responses

Referring to the figure 4, of master's student responses, we remark that the feedback percentage of good feedback (11.32%) is a small bar when compared to the bar of the feedback percentage of bad feedback (88.67%). This causes an unhappiness of the most the bachelor's students in the University of Rwanda.

4.3.3. Masters' teaching staff result presentation

The figure following, presents both good and bad feedbacks of masters teaching staff responses that includes



Figure 5: Master's teaching staff responses

The details of the figure 5 above showed master's teaching staff responses and the feedback percentage of bad feedback (75%) is a long bar compared to the bar of the feedback percentage

of good feedback (25%).

This indicates that the most of the master's teaching staff in the University of Rwanda are not happy with the e-learning and teaching platform implemented.

4.3.4. Bachelor's teaching staff result presentation

Both good and bad feedbacks of bachelor's teaching staff responses are presented in figure below.



Figure 6: Bachelor's teaching staff responses

According to the graphical representation of figure 6 which is bachelor's teaching staff responses, we conclude that the feedback percentage of bad feedback (83.33%) is a long bar compared to the bar of the feedback percentage of good feedback (16.66%). This means that most of the bachelor's teaching staff in the University of Rwanda is not happy with the e-learning and teaching platform implemented.

The higher percentage of bad feedbacks for both master's, bachelor's teaching staff and student responses were due to the three factors stated in thesis abstract. These factors are technological challenges, poverty and lack of technical support challenges. But the first challenge that teaching staff and students are facing with, is a technological one. For this reason, we would like to recommend the University of Rwanda to adapt and implement e-learning and teaching platform based on the proposed e-learning model below because it solves the problem of technological challenge.

4.4 Proposed E-learning model for University of Rwanda

A researcher developed actors identified from the review of the literature. TAM and part of The ECT model are used as a useful theoretical model to analyze students and lecturers' continuous purpose to use systems for e-learning. Previous studies found that the probability

of success has a positive association with the behavioral goal of consistently using e-learning (ElDow, 2021).

Based on the extensive literature review in the area of technology acceptance and expectation confirmation theory models, the research study proposed an enhanced technology model consisting of 9 variables which are perceived usefulness, perceived ease to use, behavioral intention, students' satisfaction, continuous intention, academic performance support assessment effectiveness and course content. Moreover, the relationships between model's variables are governed by the proposed hypotheses. Based on the proposed hypotheses the developed model relationships were structured of e-learning systems. Perceived Ease of Use

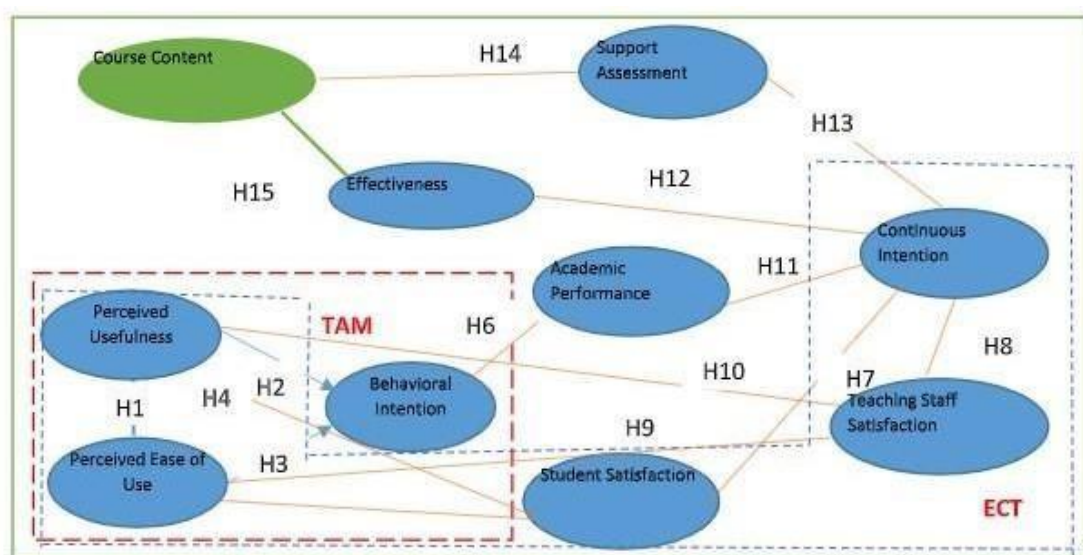


Figure 7: Proposed E-learning model for University of Rwanda

Referred to the paper written by (Dennis, 2010), perceived usefulness is the primary prerequisite for mass market technology acceptance, which depends on consumers' expectations about how technology can improve and simplify their lives. In Information Systems research, the Technology Acceptance Model (TAM) has been used to investigate users' acceptance of IT. The original model of TAM is able to predict users' acceptance of an IT by measuring their behavioral intention. User's behavioral intention is defined as a measure of the strength of one's intention to perform a specified behavior.

The principal TAM concepts are:

Perceived Ease of Use (PEOU) – the degree to which a person believes that using a

particular system would be free of effort

Perceived Usefulness (PU) – the degree to which a person believes that using a particular system would enhance his or her job performance, and,

Behavioral Intention (BI) – the degree to which a person has formulated conscious plans to perform.

The principal ECT concepts are: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Student satisfaction and Continuous Intention.

These three variables, namely PU, PEOU, and BI, are the critical factors for determining the continuation of an e-learning system. However, these factors are still insufficient to demonstrate the importance of the continuous intention to use e-learning unless they are related to other hybrid factors. The mixed elements collected from another type of technology tested to identify the positive impact of various factors on continuous intention enhancement of e-learning.

Therefore, the hypotheses established as below:

H1: A significant influence on perceived ease of use and perceived utility.

H2: A massive effect of perceived ease of use and perceived utility and purpose to behave.

H3: A significant influence on perceived ease of use and behavioral intent.

H4: A considerable effect of perceived utility and student satisfaction. H5: A significant impact on the perceived ease of student satisfaction. H6: A significant influence from the content of the productivity course. H7: A meaningful impact between academic success and behavioral intent.

H8: A meaningful impact between academic success and behavioral intent H9: A

significant impact on the perceived ease of teaching staff satisfaction

H10: A considerable effect of perceived utility and teaching staff satisfaction.

H11: A significant impact between academic success and continuous purpose.

H12: A significant influence between the happiness of students and continuous purpose. H13:

A significant influence between efficacy and continuous purpose.

This research presents thirteen theories that will discuss the continuous purpose of applying e-learning activities. The system of implementing e-learning should use in the

investigation.

The study used is TAM, and a portion of ECT models used in postulating the hypotheses.

The account suggests that using formal e-learning in the university of Rwanda context nonetheless faces layers of demanding situations. Within the dialogue beneath, we provide an explanation for the subject matters recognized above. The challenges beneath are vital elements that police makers have to note while rolling out e-learning tasks. Students reported experiencing why they choose the e-learning system. This

explains their willing in the use this mode of learning, either if it is because of good quality or its university rule. Hence, students have elaborated several reasons for choosing to use the e-learning system in table three below.

Reason to choose eLearning	Description: What is the reason for you to choose to undertake online module?	Questionnaire		QuestionNo	Reference:56
		student	Teachingstaff		
It is easy and fast	You can access where ever you are and does not take much time	☐		Q2	22
It's university proposal	It's new leaning and teaching program for university so student have to follow the rules	☐		Q2	4
Reduce cost	What is the reason for you to choose to undertake online module?	☐		Q2	15
Self-study	possibility of law materials whenever.	☐		Q2	15

Table 4: The reason to choose e-learning system theme

The findings in the above table, less costly in terms of finance and time and university proposal are the most reasons students use e-learning. Therefore, there is much similarity between the above, reason and other mentioned ones, like reduce the cost of transport and easy and fast. In

addition, some students are that they choose to use e-learning because it is a university proposal. The respondents also have elaborated on some factors that challenge them while they are willing to use e-learning services. Three factors are summarized in table 6 below.

Name: Factors influencing e-learning challenges	Description: What are the challenges faced while accessing e-learning services?	Questionnaire		QuestionNo	References:55
		Student	Teachingstaff		
Lack of support, trainings and motivation	It requires effective communication and full support for students.	☐	☐	Q6, Q7	6
Poverty (lack of required material like	Facilitate learners to get required tools	☐	☐	Q6, Q9, Q12	6
Technological challenges (internet issue)	Network as a big issue, poor interaction between instructor and student	☐		Q8	43

Table 5: Factors influencing e-learning challenges theme

Looking at this table technological challenge was mentioned several times, with 43% references. Many of the respondents pointed to poor internet connectivity as their challenge in the e-learning system. The lack of required materials like laptops is another challenge; some students reveal due to poverty they cannot afford the way of accessing class online. It is clear that the most important factor affecting e-learning implementation is lack of technology with the rate of 43%. **Where it needs to be strengthened**

Name	Description	Questionnaire		QuestionsNo.	References
		Student	Teaching staff		
E-learning improvement	If you had a chance to be a part of team who's in charge of e-learning implementation, what would you change?	☐		Q12	76
All is good	Feeling okay with the program	☐	☐	Q9, Q8	5
Facilitate students for getting tools like laptop and internet bundle	Student must have laptop and internet bundle	☐		Q4, Q12	11
Improve communication, motivation and training	Technical support provided from university	☐		Q9, Q10	25
Improve low material and the accessibility	Courses materials are not enough and the access way limited	☐		Q9, Q10, Q12	15
improve technical support	Students need technical support	☐		Q11, Q12	3
increase internet speed	Increase bandwidth, help student to get bundle	☐		Q4, Q11, Q8,	17

Table 6: Improvement in e-learning program

Table 6 “**e-learning improvement**” participants have suggested many things to improve in e-learning; they suggested “**communication, motivation and training**” comes in the first place with the rate of 25%. In this research, students are claiming insufficient support from the university in the journey that leads to e-learning. The slowness of internet speed is the other major challenge with the rate of 17% for them. The “**the low materials**”, students claim that materials and information on the e-learning system are not enough. Therefore, they request some improvement there. “**Course material accessibility**”, students claim that the way of accessing course materials, through an e-learning system is not easy for them; students are facing problems like limited skills about e-learning services, poverty, and lack of tools like laptops, desktops, and internet bandwidth. They really need some sponsors. The “**lack of motivation**” some respondents say that the way motivating eLearning users need to be improved. ” **Improve communication** “, respondents have mentioned this theme as another thing that required improvement; they argue that sometimes it’s difficult for them to use e-learning because of poor communication between them and teaching staffs, eLearning supporters. The above theme “**e-learning improvement**” is particularly for the university and the team in charge of e-learning implementation, it will help them to improve many things the e-learning program to make it successful.

To be adequate to use e-learning in teaching, students need technical support, training, motivation, and access to the stable internet. The benefits of improving all of that for students are to make successful use of e-learning.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

The factors for the successful use of e-learning determined the presence or absence of success factors of e-learning. In this study, the presence of challenges can be the cause of failure while the lack of challenges can be the cause of success.

The study attempts to find out the challenge's students face in learning at the University of Rwanda when using an e-learning program. This study also investigates whether using e-learning is beneficial to students. It emerges that implementation of e-learning at the University of Rwanda still facing some challenges which include but are not limited to academic challenges, administrative challenges, and technological challenges.

There is also some advantage, such as practices, which are harder to conduct online. Further problems should include technical issues such as students who are unable to learn individually. Another thing is that instructors need to understand their student's motivations when teaching online classes. However, it is difficult to assess students' motivation for online learning due to the lack of personal contact between students and instructors. One way to avoid this is to have students complete an online assessment form on motivation.

It should be noted that the challenges mentioned above in implementing e-learning make them imperative for the University of Rwanda to overcome them. Most importantly, there are some shreds of evidence, which link teaching staff and students concerning the preference of web-based learning, therefore next research should focus on teachers' perspectives on e-learning challenges.

5.2. RECOMMENDATIONS

Our research study recommends the following:

1. Comprehensive training of teaching staff as well as students in the field of e-learning skills.
2. Training on e-learning skills, considered a successful implementation of e-learning.
3. Facilitate teaching staff as well as students to get quick internet at home. Internet access is the major challenge for e-learning implementation, so having it in full is also considered as the success of e-learning implementation.
4. Sponsoring students for getting materials like laptops, tablets, and smart phones.
5. Provide a toll-free line to support teaching staff as well as students about e-learning system issues.
6. Introduce compulsory e-learning courses in the curricula for all students to equip them with e-learning skills as well as improve accessibility.
7. Integrate online live community engagement in the current UR-e-learning platform that will

enable learners and lecturers to communicate easily during and after course deliverance.

Based on the findings in this research, there are some recommendations for the future researchers. Related to the topic of this research, there are still many topics which can be developed and analyzed. Although this thesis was still far from perfect, it can be the basic sources for the next researcher. This research only focused on the data of implementation, other researchers can conduct research on the learning, motivation or behavioral stages.

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APPENDIX

Investigation of e-learning implementation challenges from university of Rwanda

Introduction: Dear participants; I am Valentine Kwitonda, post graduate student from University of Rwanda in information system option of e-Government, this questionnaire is attended to collect data about e-learning implementation challenges for university of Rwanda. My research aim is to investigate the challenges which hinder e-learning implementation in university of Rwanda. Hence I request you to participate in this research by providing response to the below questions according to your opinion. Many questions are related to the use of e-learning program. This survey is containing two questionnaires, one is designed to be answered by student, other is for lecturer or other university teaching staff. Please note that your participation is voluntary and be ensure that your data and responses will be confidential. For any Question don't hesitate to contact the Coordinator of master's program: Dr. Nzanywayingoma Frederick(nzanywafra@gmail.com). Your participation is highly appreciated.

Profiling Questions

Do you want to participate?

Yes ☐ No ☐

your role in university

☐ student

☐ lecturer or other university staff

Gender*

☐ Male

☐ female

your age

☐ 15-20 years

☐ 21-30 years

☐ 31-40 years

☐ 41 years or above

47

what is the level of your education

☐ undergraduate

☐ postgraduate

B. Student Questionnaire

Technical questions

Please answer each question according to your opinion

1. In general, how do you define eLearning? have you ever access online modules?
.....
.....
2. What are the reasons for you to choose to undertakeonline module?.....
.....
.....
3. Which gadgets do you use to access learningmaterials online? examples: Laptop? Desktop? Other?.....
.....
4. What are the challenges faced while accessing? e-learning services?.....
.....
.....
5. To what extent online learning have affected youracademic performance?
.....
.....
6. How your teacher supports you while studyingonline?
.....
.....
7. How does your experience of online educational programs compare with traditional in class instruction? How do you like or dislike its?.....
.....
8. How do you view your online educational environment?
E.g. Quality of graphics, layout, user friendly, navigation, etc?.....
.....
9. How do you feel about the communication between? yourself andthe instructor? Between you and other students?
.....
.....
10. How do you think the technical support provided from university? Do you receive any other type of support, such as enrolling in online class, electronic database, and written information about the program If you have any complain, is there anyone you can address to and solve your problem?.....
.....
11. Do you think your learning outcomes could be? achieved through online education? why? How?
.....
.....
12. If you had a chance to be a part of team who 's in chargeof-learning implementation, what would you Change.....
.....
.....

C. Teaching staff Questionnaire

Technical questions

Please answer all questions according to your opinion

1. Do your university offer online learning services?
If yes, how your (School or University) delivering online learning?.....
.....
2. What are your thoughts about teaching in online environment?
.....
.....
3. Describe any possible benefits of online environment
.....
.....
4. How was your experience teaching students from home as compared to teaching at school?
how do you manage your students?.....
.....
5. How helpful your (School or University) has been offering you the resources to teach from home?.....
.....
6. How helpful your co-workers have been while teaching from home?
.....
.....
7. Are your students learning as much now as they were before switching to remote learning?
how?why?.....
.....
8. What are the challenges you have experienced with in online teaching environment?
.....
.....
9. What do you think are the important factors that determinethe quality of the online instruction?
How?.....
.....
10. How can your university support you further?.....
.....