

**THE CONTRIBUTION OF ICT AND DISTANCE
EDUCATION ON THE LEARNING OF UNIVERSITY
STUDENTS: THE PRACTICAL CASE UNIVERSITY OF
RWANDA (UR), (2019 - 2022).**

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Abstract

The research study focused on the contribution of ICT and distance education on the learning of university students: the practical case University of Rwanda (UR), (2019 - 2022). The provision of ICT and distance education to university students learning in Rwanda has various contributions in addressing recurring issues such as the student enrollment trend of high school leavers who wish to join university at the first cycle (including various marginalized students), in the reduction of financial expenses (including various educational consumables), and in the administrative aspect (communication, registration, etc.). It is from this situation that the ICT appear as a possible solution to properly overcome these difficulties. This study was conducted in five colleges. A Correlational research design is used in this study. Primary data collected using questionnaire tools. Secondary data obtained from reference books, journals and Internet documents. The study covers a population of 2530 populations and a sample of 345 participants (330 for students and 15 for lecturers and teachers). The Content validity of the instruments was performed before the instruments were pre-tested and reliability calculated using Cronbach's alpha. Data are analyzed both qualitatively and quantitatively using the Statistical Package for the Social Sciences (SPSS). The study revealed that various ICT toolkits and distance learning their contribution varies between 71% and 85% of students learning within the university. It was recommended that the government and other stakeholders invest much more in the provision of ICT infrastructure to easily improve its accessibility and user ability for a large number of students and staff. It is hoped that the findings of this study and the suggested recommendations will help the government and the University of Rwanda achieve their potential goal of providing updated ICT infrastructures and distance learning. It is recommended that future researchers carry out similar research in the Rwandan private university to verify whether the contribution of private universities ICT on distance education students has the same implication or not for the public university.

Keywords: *ICT, distance education, students learning*

Around the world, the ever-increasing number of students who aspire to join higher education is impressive. The countries of sub-Saharan Africa are no exception to this constant and generally apply education as a vital area for the evolution and development of societies, beyond the difficulties

experienced by most African school systems. The ICT and Distance learning¹ are now recognized as a major component of the dynamics of the national and international economy.

In Overall, the education sector has experienced unprecedented growth in recent decades due to the revolution in distance education services (Berg, 2010). ICT and distance education have been undergoing profound transformations over the past ten years, partly as a result of the development of new teaching delivery systems. In the United States of America, in higher education alone, more than 5.6 million college students were enrolled in at least one online course in fall 2009, up from 1.6 million in 2002. (Statistics, 2010a) 33% of 2 years and 4years colleges offering distance education in the United States. In 1997-1998, this figure had risen to 44% of 2year and 4years higher education establishments. Another area that has seen unprecedented progress is Europe as the Research of (Chripa and Carl, 2014) stated that “the number of enrollments in European distance learning universities alone exceeds at least 2 million. Africa as a continent is catching up in distance education, to this effect, (Isaac and Emile, 2015), observes that “the admission of students to the University of Ghana from the academic year 2009/10, learners were admitted into the program, and another 2,508 learners were admitted for the academic year 2010/11 in addition to 748 mature students (basic statistics from the University of Ghana, 2010). The university system has not been able to accommodate the ever increasing number of qualified applicants wishing to pursue higher education in the country (British Council, 2011). The phenomenon of distance education has its origins in mid19th century Europe and the United States. The pioneers of distance education used the best technology in the era of the postal system to open educational opportunities to people who wanted to learn but could not attend conventional schools. The People who have benefited most from such distance education include the physically handicapped, women who were not allowed to enroll in educational institutions open to men, people who had jobs during the normal school hours and those who lived in remote areas where schools did not exist (statistics, 2010b). In addition to this, distance education used as a support in times of crisis, for example during the COVID 19 pandemic period, physical lessons became impossible, so the use of ICT and distance education played a key role. Not only have campus-based and remote delivery models become increasingly blurred with the spread of new technologies, but the types of providers have also changed. (Holmberg, 2010), explains that the massively growing demand for higher education has led to the creation of so-called “mega universities” and networks of universities without borders. Distance education has been a means of reaching adult learners since the early days of distance schools.

¹ More crucial information on differences between distance education and traditional education, see Peters (1989) and Holmberg (1995).

In Rwanda, experience has shown that countries around the world are adopting different strategies to increase access to higher education through ICT in order to stabilize our education sector damaged in 1994. Some countries are creating institutions dedicated to open distance learning to offer distance learning programs. These institutions depend on economies of scale to become financially self-sufficient. In Rwanda, some universities have set up dedicated open and distance learning departments with their own academic staff to deliver programs. However, some other universities establish a small unit with primary responsibility for coordinating various activities at the university level. Such a unit does not have its own staff to deliver courses through ODL, but relies on staff from other departments already offering courses in traditional, face-to-face mode. The University of Rwanda (UR) wanted to incorporate the latest option in the education sector in order to reduce the financial expenses, support the trend of the students and support the administrative matters within the institution. After the genocide²³ in Rwanda in 1994⁴ there was an excessive increase in the number of students from 4,100 in 1994 to a total of 90,803 in 2016 (Ministry of Education, 2016c) qualified to join higher education. However, despite this increase in enrolment, there is still a large gap between tertiary GER (8.59%) and secondary GER (42.74%) in sub-Saharan Africa (World Bank, 2014) an indication that a large population of young people who still do not have access to higher education. The growing number of students at the primary and secondary level has its origins in the creation of a nine-year basic education which puts pressure on the University of Rwanda at the undergraduate level, thus there is the introduction of ICT in the education sector in order to promote effective teaching within schools by contributing much more to solving the problems related to the increase in the number of pupils, financial expenses and the administrative aspect. Information and communication technologies in the education sector of Rwanda can be used to expand access to education at all levels, to enhance the relevance of education and training on the labor market, including the inclusion of 21st century skills and to improve the quality of education and training. ICTs further facilitate tackling the challenges of access, quality, equity, relevance and management efficiency with tangible benefits that can be seen and measured in various ways. Statistics showed that most of the countries of the world made primary education 52.6% in 1989, secondary

² G Prunier, *The Rwandan Crisis: History of Genocide* (New York, NY: Colombia University Press, 1995), p. 392.

³ The genocide of the Tutsi in Rwanda took place from April 7 to July 17, 1994. This genocide is historically part of a latent genocidal project for several decades, through several phases of mass massacres. Consulted 12 May 2021 on K Boudreaux, "Conflicts and Genocide in Rwanda", *The Electronic Journal of Sustainable Development* 1(3), 2009, pp. 85–94. Consulted 23/09/2021 on <https://www.jeuneafrique.com>

⁴ K Boudreaux, "Conflicts and Genocide in Rwanda", *The Electronic Journal of Sustainable Development* 1(3), 2009, pp. 85–94.

education 25.4% in 1989 and higher education 4.3% in 1989 a major theme of their internal policy, whereas for several decades now, education has been taken into account as an essential factor of human development in all areas of the world. Today, the situation in Rwanda has changed positively as there is an increase in the number of students, so the proposed approach is the use of ICT and distance learning to support the increase in the number of students. The Government of Rwanda's Education Sector Strategic Plan for 2018/2019 to 2023/24 (ESSP) describes the use of ICT in general as "fundamental" to achieving the socio-economic development outlined in Vision 2050, and its use in education as "essential". » promoting efficiency and increasing the number of access to education. The countries of sub-Saharan Africa are no exception to this constant and generally apply education as a vital area for the evolution and development of societies, beyond the difficulties experienced by most African school systems. Finally, the provision of ICT and distance education to the university student learning in Rwanda has various contributions in solving recurring problems such as the student enrollment trend of high school leavers who wish to join university in undergraduate level (including various marginalized students), in the reduction of financial expenses (including various educational consumables), and in the administrative aspect (communication, registration, etc.). In addition to this, shortage of physical classrooms, shortage of qualified teachers and shortage of various consumables in the University of Rwanda, so the contribution of ICT and distance learning to students learning to the University of Rwanda is very crucial, especially in the education sector. It is through this situation that the challenges of ICT appear as a possible solution to properly overcome these difficulties.

Literature Review

In Rwanda, education is provided at four levels: pre-primary (kindergarten), primary, secondary and tertiary (MINEDUC, 2013). MacGregor (2014) reports that higher education in Rwanda was born on November 3, 1963 with the opening of the National University of Rwanda (NUR) in the former prefecture of Butare, now called Huye District. It was created by the government of Rwanda in collaboration with the Dominican Congregation of Canada. The law establishing the first university in Rwanda (NUR) came into force on May 12, 1964. At the beginning, the university had 51 freshmen and only 16 teachers. Like Tikly et al. (Quoted in Freedman, Weinstein & Longman, 2006) says, in 1994 the university had only 1,000 alumni (30 years since its inception). The university is headquartered in Kigali. The official language of the university is English. But afterwards, there is an increase in the number of students in pre-primary, primary, secondary and university at the undergraduate level.

After the 1994 genocide, in Rwanda, the growing⁵ number of students at primary and secondary level originated on the creation of a nine-year basic education which puts pressure on the University of Rwanda at the undergraduate level. , thus there is the introduction of ICT in the education sector in order to promote effective teaching within schools by contributing much more to solving the problems related to the increase in the number of pupils, the financial expenses and the administrative aspect. In Rwanda, experience has shown that countries around the world are adopting different strategies to increase access to higher education through ICT in order to stabilize our education sector damaged in 1994. Some countries are creating institutions dedicated to open distance learning to offer distance learning programs. These institutions depend on economies of scale to become financially self-sufficient. The most notable examples of such institutions are open universities and some of them stand out as mega universities and have over 100,000 students. Some countries have set up virtual universities, which vary from being strictly universities that offer online programs to just departments offering an online program. The African Virtual University falls under this category. Some other countries prefer a blended mode with a combination of delivery methods such as online, face-to-face and distance learning. In Rwanda⁶, some universities have set up dedicated open and distance learning departments with their own academic staff to deliver programs. However, some other universities establish a small unit with primary responsibility for coordinating various activities at the university level. Such a unit does not have its own staff to deliver courses through open and distance learning, but relies on staff from other departments already offering courses in traditional, face-to-face mode. The University of Rwanda (UR) wanted to incorporate the latest option in the education sector in order to reduce the financial expenses, support the trend of the students and support the administrative matters within the institution.

Besides that, The University of Rwanda (UR) faces various challenges of students wishing to continue their studies in higher education has increased sharply in the last 20 years after the genocide and massacres of 1994⁷, their enrollment has increased from 4,100 in 1994 to 87,013 in 2014. According to statistics from the Higher Education Council (MINEDUC, 2015b), the majority of students in higher education institutions are enrolled in day

⁵ The gross enrollment ratio is “the number of students enrolled in a given level of education, regardless of their age, expressed as a percentage of the population of the official age group that corresponds to this level of education. For higher education, the observed population includes the last five years following the age of leaving secondary level. (Unesco, 2010 (2), p. 152). 23

⁶ The country of Rwanda is located in Central/East and East Africa bordered by the Democratic Republic of Congo to the west, Uganda to the north, Tanzania to the east, and Burundi to the south. accessed 10/16/2022 at <https://www.gov.rw>

⁷ G Prunier, *The Rwandan Crisis: History of Genocide* (New York, NY: Colombia University Press, 1995), p. 392.

programs (62%). Evening and weekend programs represent 36%, while students in distance education programs represent 2%. This considerable increase is mainly due to the success of a 9-year free basic education in place since 2003. The demand for higher education has steadily increased and many infrastructures have been damaged during the period of the genocide and the massacres of 1994. For example, in the 2014-2015 academic year, more than 19,024 eligible candidates applied to study at the University of Rwanda. (UR). Only 9,443 candidates (49.6%) were admitted. The practice of ICT in distance education at the University of Rwanda (UR) will be a good solution because has contributed much more to the effectiveness of teaching and learning in reducing poverty through socio transformation. economic (Mukama, 2007). An approach of using ICT and distance learning in most colleges of universities in Rwanda (UR) will remove these triple constraints of expanding enrollment of high school leavers who want to join university at first level. cycle, support for marginalized students, lack of various educational institutions and lack of qualified teachers in sufficient numbers, have thus contributed to reducing the financial expenditure within the university. The ICT and distance learning can be defined as an appropriate approach that aims to expand access to education and professional training for teachers and students by actively enabling students to overcome unforeseen and spatial obstacles and by providing flexible modes of teaching and learning that can be adapted for individuals and groups. ICTs further facilitate tackling the challenges of access, quality, equity, relevance and management efficiency with tangible benefits that can be seen and measured in various ways. Statistics showed that most of the countries of the world made primary education 52.6% in 1989, secondary education 25.4% in 1989 and higher education 4.3% in 1989 a major theme of their internal policy, whereas for several decades now, education has been taken into account as an essential factor of human development in all areas of the world. Today, the situation in Rwanda has changed positively as there is an increase in the number of students, so the proposed approach is the use of ICT and distance learning to support the increased number of students. The Government of Rwanda's Education Sector Strategic Plan for 2018/2019 to 2023/24 (ESSP) describes the use of ICT in general as "fundamental" to achieving the socio-economic development outlined in Vision 2050, and its use in education as "essential". » promoting efficiency and increasing the number of access to education.

Methods

This study aimed to identify the contribution of ICT and distance learning in Rwandan university students in terms of supporting increased number of students leaving secondary school who want to join the university, reducing various expenditures and assisting in academic and administration. This sections focused on the methodology and procedures that were adopted to carry out this study. As we know, Research methodology is a

course of action, strategy, or course of action that a researcher chooses and uses to be able to achieve desired results (Mugenda, 2003). The Purposive sampling can also be used when a known characteristic of the universe is to be studied intensively (Kothari, 2004a). Purposive sampling was applied to express the five participating universities. Purposive sampling is a non-probability sampling technique. It does not involve calculation or planning probability criteria of how the population will be represented. It is important to note that, the researcher has a free hand to select the representative population according to the objectives of the study and accessibility of the selected sample. The inclusion criteria are not predetermined, rather the researcher is free to make a decision based on study variables and constructs (Lucas, 2014). Universities want to meet the social demand for education and training as evidenced by the increase in registrations for the UNEB 2016 certificate of studies. However, to achieve the goals of universities, they should be means to put in place in order to overcome the challenges facing distance education in universities.

Research Design

This study adopted a correlational research design. According to Fraenkel and Wallen (2009), correlational study investigates the possibility of relationships between two or more variables through a correlation coefficient without any attempt to influence or manipulate them. Similarly, Amin (2005) states that the correlation method involves the collection of data to determine whether and to what extent a relationship exists between two or more variables. The Correlational research was suitable for this study as it aimed to investigate the contribution of ICT and distance learning in increasing the enrollment rate of graduate students in secondary school, reduction of financial expenditures and academic and administrative aspect. The research design addresses both the qualitative and quantitative data that the instruments of this study aimed to collect data empirically.

Therefore, a correlational research design was suitable for this study as the main objective of this study was to determine whether and to what extent the relationship exists between ICT and distance education for students at the University of Rwanda. The targeted institutions were five universities in Rwanda namely College of Letters and Social Sciences (CASS), College of Agriculture, Animal Sciences and Veterinary Medicine (CAVM), University of Rwanda-College of Education (UR- CE), the College of Science and Technology (CST) and the College of Business and Economics (CBE) (HEC, 2010) observed that specifying the population to be involved in the study is very important as it helps the researcher make decisions about sampling and resources to use. The target population of the study was concerned by a set of 2530 populations including 110 lecturers and 2420 students. Similarly, the choice was made on the assumption that at least 30% of the whole population is suitable for the sample (Borg and Gall, 2003). The Colleges were selected using a systematic sampling technique in

which institutions were first sorted alphabetically and then the four-digit range was used to select those who will participate in this research. The study used 345 participants as a sample (330 students and 15 lecturers).

The Participants

The selected colleges of the University of Rwanda (UR) were represented by students, academic staff and administrative officers. This study was conducted in 5 colleges of the University of Rwanda. The target population of the study was concerned by a set of 2530 populations including 110 teacher-researchers and 2420 students. Similarly, the choice was made on the assumption that at least 30% of the whole population is suitable for the sample (Borg and Gall, 2003). Colleges were selected using a systematic sampling technique in which institutions were first sorted alphabetically and then the four-digit range was used to select those who will participate in this research. The study employed 345 participants as a sample (330 students and 15 lecturers). The choice of these colleges of university of Rwanda was made bearing in mind that this is a good number to represent other in university of Rwanda (REB, 2018) Similarly, the choice was made as per the assumption that at least 30 percent of the entire population is appropriate for the sample (Borg and Gall, 2003). The choice of the University of Rwanda was made bearing in mind that it is a good number to represent all higher education institutions operating in Rwanda (HEC, 2019). This study was conducted in the University of Rwanda, the researcher uses Yamane's sample calculation formula to determine the sample that is used in this research, as cited by Kasunic (2005). The formula assumes a 95% confidence level and the maximum variance ($p=0.5$). The formula , $n = \frac{N}{1+ Ne^2}$ where: n is the sample size, N is the population size,

e specifies the desired level of precision, where precision $e = 1 - \text{precision}$, $p = 0.95$. $n = \frac{2530}{1 + 2530(0.05)(0.05)} = 345$. In this study, N is equal to 2530,

$e = \text{margin of error} = 1 - 0.95 = 0.05$ this becomes

Measures

This study used structured questionnaire to collect primary data. The study also used documentary review to collect secondary data (from journal articles, books, theses, etc.). The questionnaire contained close-ended questions only in the form of Likert scales (1=*Strongly Agree*, 2=*Agree*, 3=*Neutral*, 4=*Disagree*, 5=*Strongly Disagree*). The questionnaire was to be filled by ticking in the appropriate box with regard to the participants' understanding. Before collecting data, the researcher sought the authorization to collect research data from the 5 colleges forming university of Rwanda. Prior to gathering any data, the researcher sought the informed consent from the respondents using an appropriate form. Before collecting the data, a pilot study was done to establish the validity and reliability of the instruments. This was made by means of Cronbach alpha analysis. The pilot

study was done by having 10 students to fill the questionnaire and giving their feedback on it. This exercise was conducted in one public secondary school that was randomly selected. However, the selected institution for pilot study was not involved again in collecting the data for the main study. The data was taken out from the questionnaires and got into the SPSS 20. The Cronbach alphas scored were extracted as shown in the following table.

Table 1: Reliability Results

	Number of Items	Cronbach's Alpha	comments
Increase rate of enrollment	10	.600	Accepted reliability
Reduction of expenditure	10	.600	Accepted reliability
Very crucial in Academic and administrative aspect	10	.700	Accepted reliability
Overall	40	.633	Accepted reliability

Hinton et al. (2004) have suggested four cut-off points for reliability, which includes excellent reliability (0.90 and above), high reliability (0.70-0.90), moderate reliability (0.50-0.70) and low reliability (0.50 and below) (Hinton et al., 2004). The Cronbach alphas were above 60%, This indicated that most items in this questionnaire had moderate squared multiple correlations, an indication that the questionnaire passes reliability test. Cronbach alphas more than 0.7 are considered as satisfactory (George & Mallery, 2003).

In analyzing the data, the researcher used SPSS (Statistical package for Social Sciences) version 20 to make all the due calculations and to design all the important tables. According to Frey (2017), SPSS is commercially distributed software suitable for data management and statistical analysis and whose first version was developed by Norman Nie, Dale Bent, and C. Hadlai Hull in 1968. As earlier mentioned, the analyzed data was in the form of 5-point Likert scales whereby each point has been assigned a number which was entered into SPSS for data analysis. The data was made up three items containing 10 options each.

Findings

Demographic characteristics of respondents: This study involved, a total number of 2450 were sampled giving a total of 345 questionnaires that were distributed. The majority of respondents in the study on the contribution of ICT and distance education on university student learning are under the age of 25 with 137 out of 345 equivalents to (39.7%). This is because after the 1994 genocide, the government of Rwanda in 2003/2004 introduced 9 EBAs and then after the introduction of 12-year basic education for all and abolished school fees, all Rwandan children started school at an early age, the government in partnership with NGOs, launched free porridge and food in these schools resulting in increased enrollment and attendance at an older age precocious at the university level under 25 years of age. On the other hand, the population aged 25 to 35 is equal to 38.0%. This is due to the fact that some students fall under this category and the last category is the minority population that is over 35 equals 22.3%. Which means that

within the university the population over the age of 35 they are the staff which is very little compared to the students.

The proportion of men is higher than that of women 54.20% of students were men and 45.80% were women. This can be attributed to the efforts made by the government of Rwanda to encourage boys and girls to go to school earlier, but at the university level, HEC statistics, 2019 showed that men are superior to women respectively 64 % and 36%. The UNESCO report (2014) states that if all women in developing countries had completed primary education, the under-five mortality rate would drop by 15% and if they had completed secondary education, it would fall by 49%. It is very important in this study to analyze the impact of ICT and distance education on students studying in higher institutions, especially the University of Rwanda, regardless of marital status. Therefore, it was considered very important to describe the marital status of respondents in this study. Most respondents were single at 51.59% while those who were married were 41.74%, separated were 2.61% and 0.8% was widowed. According to Emejulu (2006), student learning is significantly affected by the level of education of his parents among many other family-related factors. Specifically, the details in the table show that 24.64% of the university population holds a bachelor's degree in the field. Only 14.78% of teachers hold a master's degree in the field. While 13.91% have a PhD in the field and 2.90% have a professor as a credential. From research to the field ICT plays a key role in addressing the shortage of qualified teachers at the University of Rwanda. Crucial data for this study came from students at the rate of 63.19% while staff and faculty staff 36.81%. This is due to the dairy issues dealt with by the students, staff and lecturer.

Descriptive statics on increasing the rate of students' enrollment

	N	Mean		Std. Deviation
	Statistics	Statistics	Std. Error	Statistics
Increasing the rate of university student enrolment	345	4.2319	.04676	.86845
Increasing the number of graduates considerably within the university.	345	4.3565	.04096	.76087
Enabling the students to learn effectively in the crisis period like pandemics of COVID 19	345	4.2986	.04366	.81099
Supporting students from various geographical isolation and economically disadvantaged communities	345	4.3159	.04311	.80073
Supporting the secondary school graduates who are not admitted to university to access tertiary education with good academic results	345	4.2725	.04406	.81837
The students get sufficient knowledge, skills and attitudes to contribute to socio-economic development	345	4.2638	.04373	.81233
Valid N	345			

Source: Field Data Research, 2022; Note: Strongly disagree = [1-1.8 [=Very low average; Disagree= [1.9-2.6]=low mean; Neutral= [2.7 - 3.4]=moderate average; Agree= [3.5-4.2]=Medium High; Completely agree = [4.3-5 [= Very high average.

The above results showed that most of the students surveyed agreed that seven options contribute positively to student enrollment in the University of Rwanda (UR), through the effective integration of ICT and distance learning to higher education students. These options include: Increase the enrollment rate of university students $\mu = 4.2319$ and $STD = .86845$. Significantly increase the number of graduates within the university. $\mu = 4.2319$ and $STD = .76087$, Enabling students to learn effectively in times of crisis like the COVID 19 pandemics $\mu = 4.2986$ and $STD = .81099$, Supporting students from various isolated regions and economically disadvantaged communities $\mu = 4.3159$ and $STD = .80073$, Support high school graduates who are not admitted to university to access higher education with good academic results $\mu = 4.2725$ and $STD = .81837$, Students acquire sufficient knowledge, skills and attitudes to contribute to socio-economic development $\mu = 4.2638$ and $STD = .81233$.

Descriptive statistics on financial expenditure

	N	Mean		Std. Deviation
	Statistics	Statistics	Std. Error	Statistics
Shrinking the gap of shortage of lecturer's academic qualifications in the university of Rwanda.	345	4.3652	.03717	.69043
More efficient use of limited resources while improving the quality of education.	345	4.3130	.04107	.76286
Reduction of booklets and papers of assessment for university distance learning.	345	4.3391	.04220	.78378
Effective teaching and learning for Rwandan university in distance learning	345	4.3362	.04373	.81233
Reduction of physical textbooks in university distance learning	345	4.4000	.03838	.71284
Shrinking the difficulties faced by distance learning librarians of the university.	345	4.3478	.04046	.75147
Reduction of consumables laboratories equipment for university distance learning.	345	4.4000	.03816	.70875
Valid N	345			

Source: Field Data Research, 2022; Note: Strongly disagree = [1-1.8 [=Very low average; Disagree= [1.9-2.6]=low mean; Neutral= [2.7 - 3.4]=moderate average; Agree= [3.5-4.2]=Medium High; Completely agree = [4.3-5 [= Very high average.

The results in Table 4 show that most of the respondents agreed that the following 7 reductions in financial expenditure contribute positively to student learning at the University of Rwanda with a high average, such as: Reducing the shortage gap of academic qualifications of teachers at the University of Rwanda $\mu = 4.3652$ and $STD = .69043$, More efficient use of limited resources while improving the quality of education. $\mu = 4.3130$ and $STD = .76286$, Reduction of booklets and assessment papers for university distance education $\mu = 4.3391$ and $STD = .78378$, Effective teaching and learning for the Rwandan university in distance education $\mu = 4.3362$ and $STD = .81233$, Reducing physical textbooks in distance university education $\mu = 4.4000$ and $STD = .71284$, Reducing the difficulties faced by distance university librarians $\mu = 4.3478$ and $STD = .75147$, Reducing consumables

laboratory equipment for distance university education $\mu=4.4000$ and $STD=.70875$. Similarly, UNESCO (2014) the key factor that undermines the quality of education is insufficient financing of the education sector. However, it is very important to note that in some circumstances higher education expenditure does not imply that good students are learning as they should. On this point, Hanushek (1981) states that the increase in education expenditure only bears the expected fruits when the education system has the capacity to use it effectively.

Descriptive statistics on administrative and academic aspects

	N	Mean		Std. Deviation
	Statistics	Statistics	Std. Error	Statistics
The students receive adequate tutorials as a support system for university distance learning.	345	4.2609	.04502	.83618
Play key role in scientific and academic research for university distance learning.	345	4.3014	.04389	.81528
The creation of various opportunities for institutions to communicate and provides easier access to more comprehensive and up-to-date information for university distance learning.	345	4.2899	.04354	.80877
The calculation and storage of various records such as exam results, grades for university distance learning.	345	4.3072	.04261	.79136
The Study materials are prepared and delivered to students on time for university distance learning.	345	4.3159	.04232	.78607
The communication is clear and quick from the school administrator to the students in distance learning.	345	4.3391	.04159	.77257
Valid N	345			

Source: Field Data Research, 2022; Note: Strongly disagree = [1-1.8]=Very low average; Disagree= [1.9-2.6]=low mean; Neutral= [2.7 - 3.4]=moderate average; Agree= [3.5-4.2]=Medium High; Completely agree = [4.3-5]= Very high average.

The results in the above Table , showed that most respondents agreed that the following 7 academic and administrative aspects contribute positively to student learning at the University of Rwanda with a high average, through effective use of ICT and distance learning, such as: Students receive adequate tutorials as a support system for distance university education $\mu=4.2609$ and $STD=.83618$, Play a key role in scientific and university research for university education distance $\mu=4.3014$ and $STD=.81528$, The creation of various opportunities for institutions to communicate and facilitate access to more complete and up-to-date information for university distance education $\mu=4.2899$ and $STD=.80877$, The calculation and storage of various records such as exam results, grades for distance university education $\mu=4.2899$ and $STD=.79136$, Study material is prepared and delivered to students in time for distance learning university $\mu=4.3159$ and $STD =.78607$, Communication is clear and fast between the school administrator and the students in distance education $\mu=4.3391$ and $STD =.77257$.

The Regression analysis between ICT and distance education for university student learning: This section presents the results of the regression analysis relating to the establishment of the contribution of ICT and distance education to the learning of university students in terms of the increase in the rate of student enrollment within the University of Rwanda, reduction of financial expenditure at the University of Rwanda and contribution of ICT in education and administration.

Regression analysis of Student Enrollment Trend on University Student Learning: This section includes the model summary, analysis of variance, and regression coefficients. The results of three measures helped the research conclude whether ICT and distance education contributed to the increase in student enrollment at the University of Rwanda (UR).

Table 5: Summary Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.632 ^a	.399	.249	.07915

The results on the primary data indicated that the predictor variables could explain much of the movement of the dependent variable, as shown in Table 5. The R squared was 39.9%. Based on the regression model, the study tested the hypothesis that the predictor variables collectively have an effect on the dependent variable. The results show that the independent variables (ICT and distance education) have the contribution of 39.9% of the variation in the level of the increase in student learning within the university, as explained by the R2 adjusted by 0.399, which shows that the model which is a good contribution.

Table 6 : Analysis of the Variance of the Contribution of ICT and Distance Education to the Trend of Student Enrollment.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.017	1	.017	2.654	.179 ^b
	Residual	.025	4	.006		
	Total	.042	5			

This test is driven by the F statistic of Table 6 which indicates that its p-value of 0.179 is greater than α of 5% for the coefficient of each variable, therefore statistically insignificant different from zero. This meant that at the 5% level of insignificance, the study rejected the null hypothesis and inferred that the targeted independent variables were jointly statistically insignificant in predicting the value of changes in increased enrollment. from college students to university students learning through ICT and distance learning. Based on the above results, the study concluded that the independent variables contribute insignificantly to the dependent variable.

Table 7 : Regression Coefficient of Contribution of ICT and Distance Education to Student Enrollment Trends.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t
		B	Std. Error	Beta	
1	(Constant)	-.904	3.267		-.277
	Students enrollment trend	1.241	.762	.632	1.629

The results in Table 7 revealed that there was a positive and non-significant relationship between the independent variable and the dependent variable ($\beta = 1.241$ p-value > 0.05). This means that one unit of change in both variables increases by 1.241 units while remaining constant. Moreover, there was a positive and insignificant relationship between the increase in the rate of students and the students learning at the university.

$Y = 1.241X_1 - 0.904$; Where: Y: refers to factor 2 as the dependent variable (student learning) and X 1: refers to factor 1 (ICT and distance education for increasing student enrolment)

Regression analysis on student financial expenditure on university student learning: This section includes model summary, analysis of variance and regression coefficients. The results from three measures helped the research to conclude whether ICT and distance learning has contributed on the reduction of financial expenditures in the university of Rwanda (UR).

Table 8 : Summary of the model for the contribution of ICT distance learning to the reduction of financial expenditure for student learning

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.584 ^a	.342	.210	.10426

a. Predictors: (Constant), financial expenditures)

The results on the primary data indicated that the predictor variables were able to explain much of the movement of the dependent variable, as shown in Table 8. The R squared was 0.342. Based on the regression model, the study tested the hypothesis that the predictor variables collectively have a contribution on the dependent variable. The results show that the independent variables (ICT and distance education) have a contribution of 34.2% of the variation in the level of student learning support in terms of financial expenditure, as explained by the adjusted R2 of 0.342, which shows that the model is a good improvement.

Table 9: Analysis of the variance of the contribution of ICT and distance education to the decrease in financial expenditure of university students in apprenticeship.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.028	1	.028	2.593	.168 ^b
	Residual	.054	5	.011		
	Total	.083	6			

This test is driven by the F statistic of Table 9, which indicates that its p-value of 0.168 is greater than α of 5% for the coefficient of each variable, thus statistically insignificant different from zero. This means that at the 5% level of insignificance, the study rejected the null hypothesis and inferred that the independent variables studied were jointly statistically insignificant in predicting the value of changes in the reduction in financial expenditure for university students learning through ICT. Based on the above results, the study concluded that the independent variables contribute insignificantly to the dependent variable.

Table 10: Analysis of coefficients on the contribution of ICT and distance education to financial expenditure decreases in university student learning.

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	13.337	5.558		2.400	.062
Dépenses Financières	-2.053	1.275	-.584	-1.610	.168

The above results revealed that there was a negative and non-significant relationship between the independent variable and the dependent variable ($\beta = - 2.053$ p value > 0.05). This means that one unit of change in both variables decreases by 2.053 units while remaining constant. Additionally, there was a negative and insignificant relationship between reduced student spending and students learning in college.

$Y = - 2.053 X_1 + 13.337$; Where: Y: refers to factor 2 as the dependent variable (student learning) and X1: refers to factor 1 (ICT and distance learning in reducing financial expenditure)

Regression analysis in the academic and administrative aspect on the learning of university students: This section includes the model summary, analysis of variance, and regression coefficients. The results of three measures helped the research conclude whether ICT and distance learning contributed much more to the administrative and academic aspect in the selected colleges of the University of Rwanda (UR).

Table 11: Summary of the regression model for the contribution of ICT and distance education in academic and administrative aspects to student learning

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.420 ^a	.176	-.030	.09267

a. Predictors: (Constant), Aspect Administrative and Academic

The results on the primary data indicated that the predictor variables were able to explain much of the movement of the dependent variable, as shown in Table 11. The R squared was 0.176. Based on the regression model, the study tested the hypothesis that the predictor variables collectively have a contribution on the dependent variable. The results show that the independent variables (ICT and distance learning) have a contribution of 17.6% of the variation in the level of support for students in the Administrative and Academic Aspect, as explained by the adjusted R2 of 0.176, which shows that the model is a good contribution in the study.

Table 12: Analysis of the variance of the contribution of ICT and distance education in the academic and administrative field in the learning of university students.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.007	1	.007	.854	.408 ^b
	Residual	.034	4	.009		
	Total	.042	5			

This test is driven by the F statistic of Table 12 which indicates that its p-value of 0.408 is greater than α of 5% for the coefficient of each variable, therefore statistically insignificant different from zero. This means that at the 5% level of insignificance, the study rejected the null hypothesis and

inferred that the independent variables studied were jointly statistically insignificant in predicting the value of changes in administrative aspect support. and academic to the learning of university students. Based on the above results, the study concluded that the independent variables contribute insignificantly to the dependent variable.

Table 13: Analysis of the coefficients on the contribution of ICT and distance education in the academic and administrative field in the learning of university students.

Model		Coefficients ^a			
		Unstandardized Coefficients		Standardized Coefficients	t
		B	Std. Error	Beta	
1	(Constant)	-1.614	6.526		-.247
	Aspect Administrative and Academic	1.402	1.517	.420	.924

The results in Table 13 revealed that there was a positive and non-significant relationship between the independent variable and the dependent variable ($\beta = 1.402$ p value > 0.05). This means that one unit of change in both variables decreases by 1.402 units while remaining constant. Furthermore, there was a positive and insignificant relationship between ICT support in the academic and administrative aspect and students learning at university.

$Y = 1.402X_1 - 1.614$; Where: Y (refers to factor 2 as dependent variable (student learning)) and X 1 (refers to factor 1 (support of ICT in academic and administrative aspects))

Table 14: Descriptive statistics for students learning within university

	N	Mean		Std. Deviation
	Statistics	Statistics	Std. Error	Statistics
The students receive adequate tutorials as a support system for university distance learning.	345	4.3391	.04119	.76501
ICT plays key role in scientific and academic research for university distance learning.	345	4.5565	.03569	.66286
The creation of various opportunities for institutions to communicate and provides easier access to more comprehensive and up-to-date information for university distance learning.	345	4.3043	.04450	.82660
The calculation and storage of various records such as exam results, grades for university distance learning.	345	4.4377	.04032	.74886
Study materials are prepared and delivered to students on time for university distance learning.	345	4.4464	.03799	.70558
The communication is clear and quick from the school administrator to the students in distance learning.	345	4.4203	.04147	.77019
The graduation and qualification for students' distance learning program delivered on time.	345	4.2006	.04950	.91817
Valid N	345			

Source: Field Data Research, 2022

Note: Strongly disagree = [1-1.8 [=Very low average; Disagree= [1.9-2.6[=low mean; Neutral= [2.7 - 3.4[=moderate average; Agree= [3.5-4.2[=Medium High; Completely agree = [4.3-5 [= Very high average.

The results in Table 14 show that most of the students surveyed agreed and strongly agreed that students at the University of Rwanda (UR) make a great

contribution to learning. These options include: Graduation and qualification for the student distance learning program are delivered on time $\mu=4.3391$ and $STD=.76501$. The results are explained by the fact that money is the first condition to be fulfilled in order to obtain a university qualification. This means that, whenever you do not pay tuition, you cannot go to university to obtain the degree. These results contradict those of Kabubo-Mariara and Mwabu (2012) who concluded that ICT and distance education contribute much more to reducing the family economy. Also, the National Institute of Statistics of Rwanda (2019) indicates that the highest degree holder in Rwanda is still high (38.2%) although there has been a continuous increase. The Student achievement is relatively high within the university $\mu=4.5565$ and $STD=.66286$, Student engagement in their learning within the university is very high $\mu=4.3043$ and $STD=.82660$, Motivation of students in their learning within the university is very high $\mu=4.4377$ and $STD=.74886$, Students have positive attitudes towards their learning within the university $\mu=4.4464$ and $STD=.70558$, Increased portability training for students within the university $\mu=4.4203$ and $STD=.77019$, The student dropout rate is relatively very low $\mu=4.2006$ and $STD=.91817$.

Discussion

As stated earlier, Following the findings mentioned above, Majority of respondents responded that ICT and distance learning program play a key role in enabling students to learn effectively in times of crisis like COVID pandemics 19, support students from diverse geographic isolations and economically disadvantaged communities. The contribution of ICT to the reduction of financial expenditure is to be highlighted as Reduction of booklets and assessment papers for distance university education, Reduction of physical textbooks, Reduction of difficulties faced by distance education librarians of I 'university. This finding is partially supported by Raamesh (2012) who found that the size of the school library in terms of staff and the books it contains is strongly related to students learning to read. Reduction of laboratory equipment consumables for distance university education. Findings supported by Khawla and Abdul (2010) who linked laboratory experiments with student learning. In addition, the majority of respondents agreed and strongly agreed that they receive adequate tutorials as a support system for distance university education, in science and academic fields. Research for distance university education, creating various opportunities for institutions to communicate, and providing easier access to more complete and up-to-date information, study materials are prepared and delivered to students in time for teaching distance education. Following the obtained results, the majority of respondents strongly agree that student learning within the university is perfect as graduation and qualification for the distance learning program of students are delivered on time, student engagement in their learning within the university is very high, student motivation in their learning within the

university is very high, students have positive attitudes towards their learning within the university. This is supported by the fact that the new era of computer application technology has helped students to work actively than individual students working alone without a computer and regularly attending class (Ames, 2012). The increased portability of training for students within the university and the student dropout rate are relatively very low.

Conclusion

As per the above findings, it was concluded that in this era, ICT plays an important role in various activities, as stated earlier, the study concluded that ICT and distance education have a significant contribution on the learning of students in selected public colleges of the University of Rwanda. Overall, the study concluded that ICT has a significant contribution to increasing student enrolment, reducing financial expenditure in teaching and learning, supporting administration and academic matters at the University of Rwanda. After the genocide that occurred in Rwanda in 1994, which negatively affects the Rwandan country due to all the damaged sectors like education and others, the reconstruction of the country is therefore a long process, for example, our education sectors are facing many challenges like shortage of qualified teachers, shortage of teaching materials, classrooms, textbooks, etc. Thus, the integration of ICT and distance learning has contributed much more to the retention of students at the university level, helping to reduce financial expenses and supporting administrative and academic matters at the University of Rwanda. It has also supported high school graduates who are not admitted to university to gain access to higher education with good academic results, thus reducing the shortage gap of academic lecturer qualifications at the University of Rwanda.

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