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STUDENTS' PERCEPTION ON THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN POLYTECHNICS

"A case of IPRC Kigali"

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Thesis submitted in partial fulfilment of the requirements for the award of Master of Education in Curriculum and Instruction

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Kigali, August 2019

DECLARATION

This research project is my original work and has not been presented to any other Institution. No part of it should be reproduced without the authors' consent or that of University of Rwanda.

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SUPERVISOR'S APPROVAL

This research project entitled "**Students' perception on the use of Information Communication Technology in Polytechnics"** has been submitted with our approval as The University of Rwanda

Supervisor

Name**: Prof. Evode MUKAMA**

Sign _____ Date _____

DEDICATION

This research is dedicated to my precious wife and children who are my inspiration. To my lecturers and all of my friends and colleagues for their encouragement, support and guidance. Finally, I hope this work will guide the future of the use of ICT and bring the impact on students learning environment.

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ABSTRACT

Information and Communication Technology (ICT) has become an engine to speed up knowledge construction and sharing especially in education. ICT has been used to solve social problems and needs of daily lives through education for the development of the world. This research entitled "students' perception on the use of ICT in Polytechnics: case of IPRC Kigali aims at analyzing the students' views on the use of ICT in their learning activities. It was based on qualitative method by which secondary data analysis of various researches and descriptive research has been tackled using interviews and documentary reviews targeted 18 respondents composed of 8 female and 10 male students from IPRC Kigali have been interviewed. The study revealed that ICT has a great impact on students' academic success and other curricular issues when it is used effectively to strengthen learning like demonstrating simulation and real world object. Ineffective uses also have impact on student's learning like the social media that can divert course. In comparison of both use, some measures have been proposed to increase the level of success in polytechnics such as intense use of ICT for lecturers to prove some real world examples, motivating students while using ICT tools for better performance and understanding during their studies. The study suggested that polytechnics should sustain their ICT e-learning given that it is an enabling tool for academic tasks that is more effective, rapid, and reliable, yielding results of high quality. The research elaborated all suggestions on the use of ICT, its effective use for learning purposes in Polytechnics to improve scholastic performance where it predicts success. Further researches can cover other aspects of learning other than students' perception on the use of ICT and be broadened to other public and private polytechnics other than IPRC Kigali.

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ACRONYMS

MS Office : Microsoft Office

EAC : East African Community

MINEDUC : Ministry of Education

GoR : Government of Rwanda

IPRC : Integrated Polytechnic Region College

ICT : Information and Communication Technology

IT : Information Technology

RITA : Rwanda Information Technology Authority

NICI : National Information and Communication Infrastructure

BECTA : British Education Communication and Technology Agency

UNESCO : United Nations Educational Scientific and Culture Organization

ZPD : Zone of proximal development

CHAPTER ONE: INTRODUCTION

1.1 Background to the study

Information Technology (IT) that recently changed to Information and Communication Technology (ICT) has been integrated into schools in a way that it has become one of the pillars of developed societies. Countries (Rwanda included), embrace the use of ICT as one of the remarkable tools for educational transformation. ICT potentially contributes to student's learning and is presented as set to transform education because it is used as a major tool in the classroom to motivate and speed up students in learning. Nowadays, teaching and learning is to incorporate ICT into instruction (Weston, 2005).

Although, Rwanda is striving to include ICT in all developmental aspects, education sector is still facing technological related challenges. Therefore, integration of technology can be one of the remedies. The use of technology in education is very important to a greater extent that it motivates students, improves conceptual understanding and retention of key topics, and helps simplify the use of regular assessments to keep track of student performance.

Mukama & Anderson (2008) noted that the awareness and motivation to use ICT in teaching and learning depend to a great extent on whether teachers can handle the technology. They added that having sufficient time to practice and working together to solve problems can enhance student's active involvement in learning with ICT.

According to Grajek (2017), today's technologies, such as digital services and new devices, are becoming the soul of society day by day. Thus, it is no surprise such technologies are being used in college and university classrooms. Many professors use technology in hopes to improve their teaching strategies. Some professors may employ a diverse range of technology such as presentation tools, social networking, and digital media, which have the potential to increase students' attention and participation as well as increase their academic achievement. However, there are also many professors who do not embrace technology in the classroom, whether it is through the lack of technology used in instruction or flat out preventing students from bringing their own technology to class.

Researches indicate that a number of educational policies have been formulated in many countries and they reveal that educational innovations in ICT have been increasingly embedded within a broader framework of education reforms with the purpose of developing students' capacities for learning. ICT adds value to the processes of learning, and in the organization and management of learning institutions.

Meenakshi (2013) highlited that technology was not only integrated into schools but also permeates the business environment, underpins the success of modern corporations, and provides governments with an efficient infrastructure. The Internet is a driving force for much development and innovation in both developed and developing countries.

1.1.1. Modeling ICT in Curriculum

MINEDUC (2016), indicate that developing a curriculum for ICT requires having a model for ICT development as a representation of the essential characteristics of ICT development that provides a scaffold or framework. Such a framework shows the interrelationship of various components within a system for educational administration and policymaking purposes.

UNESCO (2002), identified two models that are used for a framework. The first model conceives ICT development as a continuum along which an educational system or an individual school can pinpoint the approach that relates to the growth of ICT for their particular context.

The second model depicts different stages in such a way that those who are most involved in the use of ICT in schools (teachers and students) discover, learn about, understand, and specialize the use of ICT tools.

1.1.2. Stages of teaching and learning with ICT

UNESCO (2000), discovered that both teaching and learning are activities which are interrelated and interconnected. They involve four stages such as discovering ICT tools, learning how them, understanding how and when to use them, and specializing in their use.

Discovering ICT tools

The first stage known as Discovering ICT Tools is where teachers and learners go through in ICT development and their general functions and uses. The main emphasis is put on its literacy and basic skills.

Learning how to use ICT tools

The next stage entails the application of tools in various disciplines. Either general or particular applications of ICT are catered for, and linked with its application approach.

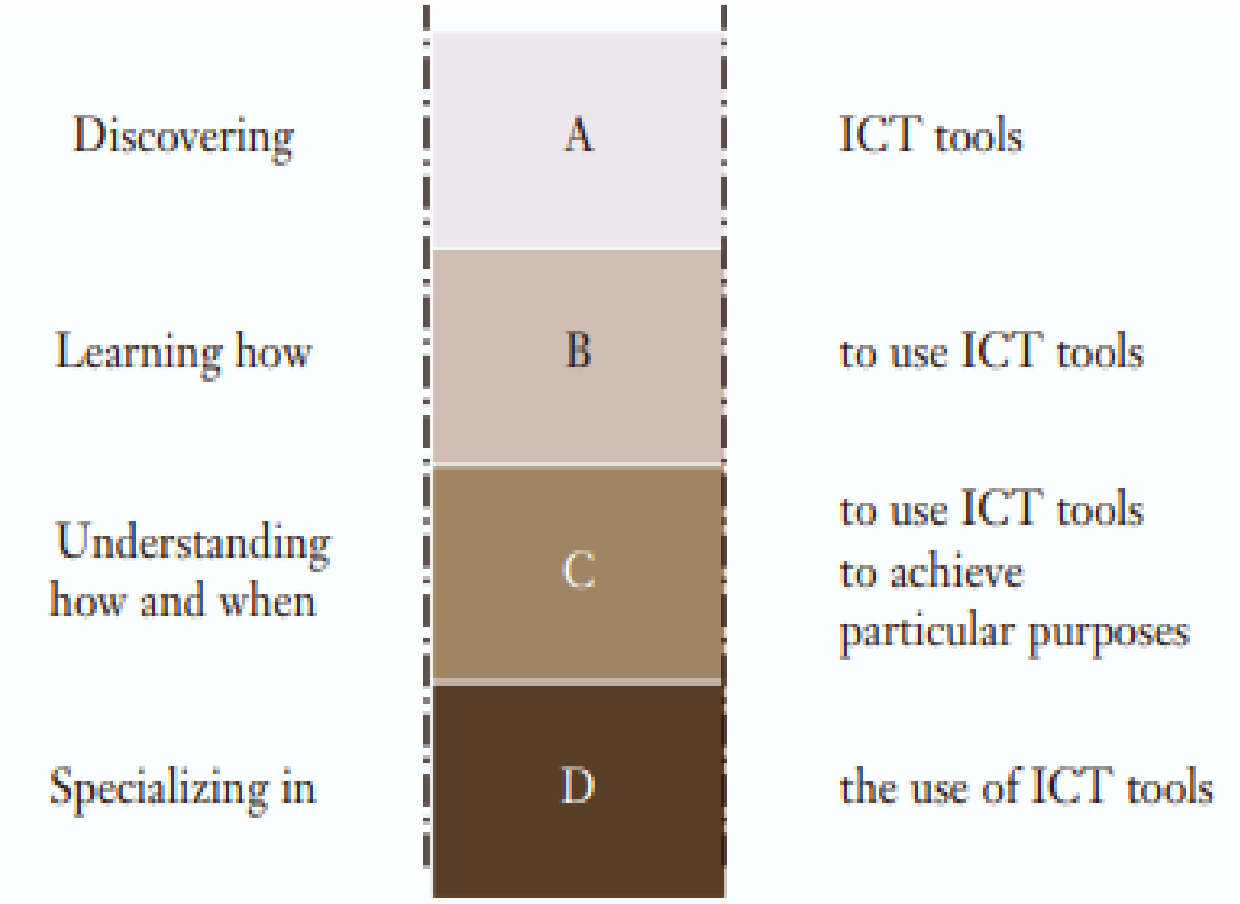
Understanding how and when to use ICT tools

This stage denotes the ability to distinguish where and which ICT tools to be used for a specific work.it is therefore linked with the infusing and transforming approaches.

Specializing in the use of ICT tools

The last stage refers to specializing in ICT tools application where specialization is needed specifically in science and technology. The following figure shows the 4 stages.

Figure 1.1: Stages of Teaching and Learning with ICT



1.1.3 ICT in Rwandan education

Each country dreams to offer affordable education that matches the country's financial capabilities. Since ICT in modern societies plays an important role, its introduction into education is high on any political agenda. As an ICT Hub in the region(Africa), Rwanda is sought to advance in smartness through new technology in every service and activity like smart city, smart agriculture, smart card for banks and transportation, to name a few. Hence, a smart education where ICT will be a key tool in daily activities for students and teachers.

As the Government of Rwanda (GoR) is committed to strengthening education in science and technology where specific interventions are to address the under-developed skills in all areas of science and technology and the limited resources in teaching institutions, ICT should be used to support the quality learning in science and technology education across all subject areas since it is an energetic tool for development (UR, 2017).

The emphasis put on ICT in Education entails harnessing the innovation, improvement of quality education, increase of access of learning methods and materials, including new categories of learners, fostering both communication and collaboration skills, and building capacity of all those involved in providing education.

According to Mukama (2009), learning and the use of ICT in Rwanda can be achieved through an investigation of students' and teachers' interaction and action which somehow constrains both students and lecturers. The constraints include the learning conditions that can help or constrain newly qualified teachers or students to learn in ICT-based environments, kinds of discourses students and teachers in small groups engaged when in computer-supported collaborative learning activities, the meaning reflected in newly qualified teachers' or student teachers' accounts of learning in computer-supported activities, and the learning conditions for language brought to the study of web-based literature in small groups.

Conversely, Mukama (2009) indicated how these constraints can be managed and eliminated to favor the integration of ICT in schools as a learning tool. Learning conditions including arrangements made in social practice in order to support students' thinking and learning, such as classroom organization, socio-cultural context, and access to computers, teachers' assistance or guidance strategies were deemed important.

The plan of impact of ICT in Rwandan Education

Having been considered a key driving force for economic development in Rwanda, MININFRA (2008) has shown how ICT was strongly initiated in such a way that a national communication fibre optic network with cross border connection to submarine cable is currently being laid across the country and is expected to bring connectivity countrywide. Another effort concerns the reduction of access costs through import tax exemption on ICT devices.

Although initiatives were set out, the dissemination of ICT use nationwide specifically in education, is till challenged with IT infrastructure, lack of clear understanding of linkages between ICT and expected education outcomes, lack of expertise and project management skills, capacity gaps among teachers, lack of technical support and inadequate coordination of initiatives frequently hinder their success (MININFRA, 2008).

All high education in Rwanda are familiarizing with ICT in their education. This has improved the education and the development of the country in general which has made Rwanda an ICT Hub in Africa. Rwanda is making big effort in the education for making its bright future. Since the high percentage of the population in Rwanda is young, the country is lightening every young people to be involved in education or other training schools put in place for them. Many competitions on ICT in different areas like agriculture, online services, robotics, are organized. The country also has established polytechnics with the purposes of increasing the level of education from one point to another.

Strategic priorities of ICT in Rwandan Education

According to MINEDUC (2016), six strategic priorities of ICT in Rwandan education are to be focused on and they include:

1. Promoting an ICT in education culture - through the development of outreach material and the building of a common platform designed to raise awareness of the role of ICT in education, share ICT resources in education and good practices, and position Rwanda with regard to international standards and the EAC in particular;

2. Fostering and managing ICT in education initiatives through development of a framework and guidelines to build and strengthen partnerships between different stakeholders through Private pubic partnerships.

3. Expanding ICT infrastructure to increase access through providing power, connectivity and equipment to educational institutions, particularly at the primary and secondary levels and outside the main cities and maintaining and upgrading existing infrastructure;

4. Developing capacity to integrate the use of ICT into education practices through training of teaching staff on integrations of ICT into the teaching practice, development of ICT standards and competencies and provision of technical and pedagogical support in schools;

5. Developing and disseminating quality digital content and customizing it to the Rwandan context and aligned with the national curriculum;

6. Establishing Open, Distance and e-Learning (ODeL) through development of an ODeL policy and strategy, building on existing initiatives at the higher education level through development of bridging courses for entry into UR and using the Rwanda Education Commons programme as a vehicle for increasing teachers' knowledge and pedagogical skills through ODeL. Training institutions in underserved areas will be particularly targeted as will learners at the secondary level who have dropped out of the education system.

As ICT in education is a particularly dynamic field, innovative solutions in the areas of infrastructure, capacity and digital content development should be fostered to meet the needs in those rural areas where alternative ICT in education solutions are required.

1.2 Statement of the problem

In its vision 2020, Rwanda supports the integration of ICT at national level in its different sectors of development. From 2016 after the approval of policies of ICT in education; the education sector faces some challenges regarding ICT integration in schools such as expertise turnover in learning institutions, lack of awareness on the role, conservatism, undeveloped infrastructure such as electricity, connectivity, and equipment, limited technical and pedagogical support in schools and limited community participation (private-public partnership). All these problems affect the students' learning. Students may not be able to generate all necessarily ICT skills for learning.

This study that investigated students' perception on the use of ICT at IPRC Kigali would provide opportunities for information access and encourage students to be independent and active, reduce time consuming while learning, cost reduction, transition from traditional to digital learning. For instance, time taken by students in note taking in class is no longer used because by the use of ICT, the softcopy is shared after course delivery.

Thus, helping students improve their academic performance. This implies that students' perceptions determined the level of usage of ICT tools in class compared to the way students use them in other activities.

1.3 Objectives of the study

The study has both general objective and research questions which are as follows:

1.3.1 General objective

The research analyzed students' perceptions on the use of ICT for their academic activities.

1.3.2 Research questions

1. How do IPRC's students perceive the use of ICT tools for learning activities?
2. How do IPRC's students get access to ICT resources for learning to meet their expectations?
3. To what extent ICT resources motivate IPRC's students to use these pedagogical tools in learning?

1.4 Significance of the study

Based on stated objective, the following stakeholders would find this research significant: the findings of the research would enable policymakers and administrators in education propose
ICT resources that is responsive to students' needs and expectation in IPRC Kigali. The effective use of ICT in learning would come up with policies to increase the success of students.
The findings and recommendations of the study would inform IPRC lecturers on improvement and maintainability needed in teaching when using ICT. This research would add to the existing literature for academic use and for practitioners in the area of Education, ICT in education department in particular.

1.5 Scope and Limitations of the study

1.5.1 Scope

The Integrated Polytechnic Regional College (IPRC) Kigali was the first Polytechnic established by the Government of Rwanda in 2008 as Kicukiro College of Technology with a core mission to develop and provide professional, technical education at diploma level. IPRC Kigali has a vision of providing quality education that complies with applicable standards through vocational education enabling students to acquire skills required to create jobs and compete in the labor market. Five departments; Civil engineering, Electrical & Electronics and Telecommunication, Mechanical Engineering and ICT are found therein and use new technology of learning to implement ICT in education whereby IPRC Kigali takes the lead like other higher learning institutions.

The research has been carried out at IPRC Kigali, located in Kicukiro District, as a case study and has not covered all public polytechnics. The study specifically endeavored to determine the expectations from ICT use and it covered the period ranging from May 2016 to May 2017 as the period in which innovations in ICT were exhibited in many polytechnics.

1.5.2 Limitation

For academic purposes, the research was conducted at IPRC Kigali as the first public polytechnic established in 2008 and embracing new technology as a higher learning institution.

The results obtained would be used to have a clear image for other polytechnics in Rwanda and evaluate how their students perceive the use of ICT when learning.

1.6 Definition of terms

The following definitions of terms were used to operationalize the study:

1. **Education Professional**: a teacher with the know-how to teach students effectively.
2. **Student**: A person who seeks knowledge from professional teachers.
3. **Education**: A process of imparting or acquiring knowledge.
4. **ICT:** Information and communications technology (ICT) refers to technologies that provide access to information through telecommunication mediums.

5. **ICT resources:** resources needed by the agency to meet the informational requirements.
6. **Perception:** the way something is regarded and interpreted
7. **Polytechnic:** An institution of higher learning offering courses at degree level or below, especially in vocational subjects.

1.7 Summary of Chapter one

This chapter introduced the area to be analyzed. It clarified the focus of the student which pushed the researcher to choose the topic. It has provided the preliminary background information of the study with topic brief for both globally and locally in Rwanda. Problem statement, objectives, significance, scope, and limitations of the study were provided.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Technology plays an important role in education as it benefits both the learner and the teacher. Integration of ICT in learning activities has tremendously transformed education. The chapter reviews literature in various aspects of ICT use in education. It presented a conceptual framework and come up with a summary of the chapter. It presented the existing and the ongoing works related to this study by comparing it with existing researches. Weakness and strength of existing researches have been explored. It shows students' views and proposed ideas related to ICT tools in higher learning institutions and all suggestions have been compared with the proposed solution carried out by this research.

2.2 Theoretical review

2.2.1. Impact of incorporation of technology into instruction

Numerous studies have examined the impacts of incorporating technology into instruction because of the need to find effective teaching methods for incoming students. Culp, Honey, & Mandinach (2005) argued that students are constantly exposed to and interacting with various forms of technology in their personal, academic, and career lives to such an extent that traditional teaching methods might be ineffective.

Jamil & Shah (2011) indicate that incorporating technology into instruction can have positive impacts due to the fact that it is assumed students will have better experiences with technology incorporated into the course because of increased engagement, convenience, relevance to student life, interest in technology itself, and presence of new learning opportunities.

Basing on Alaa, Natalie & Cathy (2013) assertion, the use of a diverse technology by professors such as presentation tools, social networking, and digital media, while instructing, have the potential to increase students' attention and participation as well as increase their academic achievement.

In supporting this notion, Odom, Jarvis, Sandlin, & Peek (2013), show that using social media tools had some advantages in helping to increase quality and efficiency of communication between students and the instructor. It was also found that social media made it easier to access class information, collaborate on group projects, and build stronger social connections between classmates. Thus, technology made it possible for the professors to teach classes without their physical presence.

However, incorporating technology into instruction does not come without challenges. Some studies have found that doing so does not have a positive impact on student experiences. Lay-Hwa Bowden & D'Alessandro (2011) found that technology was not found to be positively related to the student experience since not all students are comfortable or have knowledge regarding the use of technology (Kennedy, Judd, Churchward, Gray, & Krause, 2008).

For Alaa et al., (2013), bringing technology into instruction can have both positive and negative impacts. On one hand, technology can strengthen instruction such as by "translating" the learning process into a language the digital natives can understand. On other the other hand, technology in instruction can have negative side effects such as creating distractions from the tasks at hand. Finally, it can be concluded that if the modifications and rectifications in the technological strategies executed by professors are made to minimize the negative outcomes, then this will be the best step for advancement in education.

Mukama & Andersson's (2008), supported the change that is needed in ICT-based learning environment. They argued that coping with change in ICT-based learning environments requires learning conditions that can enable students not only to create new things and to solve problems that they encounter in their everyday lives, but also to demonstrate the achievements of their creativity and problem-solving abilities. Furthermore, previous findings on computer-supported collaborative learning.

In the same perspective, Mukama (2014), explores the way of integrating ICT into teaching and learning through a pedagogical based approach characterized by three main aspects. Firstly, technology is brought to students' sociocultural proximity: change in learning practice depends to a large extent on whether technology is positioned in students' physical, cultural and contextual proximity.

Secondly, learning activities are organized around authentic and real world technology enhanced projects. The learners are given some degree of responsibility and autonomy to make personal investigation in order to shape their understanding. The development of real life experiences is supported by collaboration. In other words, learning emerges from learners' actions in the interplay of the 21st century skills, namely critical thinking and problem solving, creativity and innovation, communication and collaboration. Thirdly, technology is in the background of the process of learning, and knowledge construction becomes at the forefront.

Mukama (2008) underlined the sociocultural theory which is referred to as a cognitive theory. Interdependency and construction of human development processes are central to this perspective. According to Vygotsky (1978), the process of knowledge construction takes place through a discourse between people at the social level (inter-psychological) and then at the individual level (intra-psychological). Thus, knowledge appropriation implies that individual learners participate actively in shared experience that "is oriented to action of personal and social significance and to the continual enriching of the framework within which future experience will be interpreted.

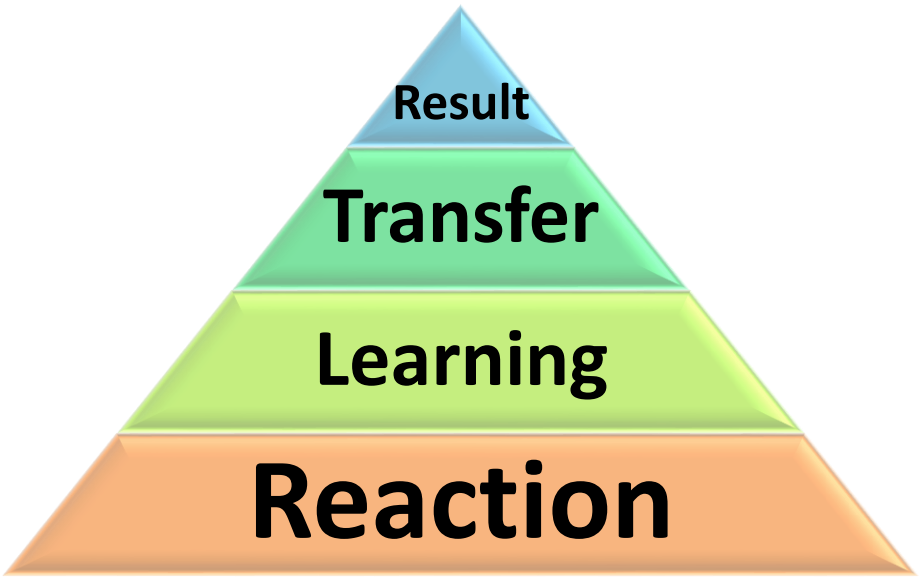
Mukama (2013) asserts that students who receive teacher assistance in technology-based learning environments gain much more from a computer than those who work independently without help (Nevgi et al., 2006). Teacher assistance may be required to sustain the process of knowledge building.

Mukama (2013) also highlighted that cognitive support from a teacher or another person more experienced can expand students' personal learning through the zone of proximal development (ZPD). The ZPD has been conceptualized in learning practices as a process of learners' guided participation (Rogoff, 1995) or guided knowledge building (Mercer, 1995), or as a process of scaffolding (Bruner, 1978) with a more skilled partner. According to Reiser (2001), in order to evaluate their progress, students should refer to the relevant criteria or behavior that the program is designed to address (criterion-referencing) rather than focusing on comparison between students' aggregated abilities.

In his research Canas (2003) emphasized on the theory of Cognitive Flexibility as human ability to adapt the cognitive processing strategies to face new and unexpected conditions in the environment. The latter highlights four evaluation levels namely reactions, learning, transfer and results.

In this four-level model, each successive evaluation level is linked with information provided by the lower level in which assessment is done respectively. The following level is analyzed based on the information provided by the previous level (Kirkpatrick, 1996).

Figure 2.2: Kirkpatrick's four-level model



Reaction level attempts to find solutions to problems related to participants' perceptions while learning– and if learning material was relevant to the work. Moreover, the reactions of participants affect learning (level two) in a positive or negative way.

Learning level encompasses teaching that should exceed learner's satisfaction and attempts to assess skills, knowledge, or attitude of the learner.

Transfer level shows the level of participants in applying what they learned during training. Teaching at this level attempts to find the answer related to readiness in using all what was newly acquired.

Evaluation/result level attempts to assess training in terms of change in the training institution whereby success is based on compliance with the mission of institution. The research has therefore been built on cognitive flexibility since it dealt with new technologies that have been implemented in education. It dealt with the adaptation of IPRC students to technology in their education and evaluate the outcomes.

2.3 Empirical review

2.3.1 The impact of ICT resources in students' environment

The use of ICT changes learning in several ways. With ICT, students benefit from learning materials at their disposal. This makes learning environment more meaningful. It offers increased possibilities for codification of knowledge, innovation in learning through being able to deliver learning and cognitive activities anytime and anywhere (Patrick et. al.,2015).

ICT constitutes an input in the student learning process that should help produce better learning output. Its use can positively transmit knowledge to students as Bonnet (1997) argued that the use of available tools is helpful to students in exploiting possibilities to acquire information for learning purposes. Riel (1998), also confirmed that ICT in education may be related to the students' socio-cultural proximity that considers the learner's' physical, cultural, and contextual real world. Unlike Davis (2000), availability of ICT resources is useful to learners with learning disabilities since it enables teachers prepare suitable materials according to individual's needs.

In contributing to improvement of learning, Riel highlighted the usability of ICT resources in students' environment by showing that when ICT resources are used in opposing activities, they divert students from their learning.

The Swedish National Agency for School Improvement (2008) revealed a positive impact brought by technology on knowledge acquisition and the performance of the learner when the latter is an incorporated element in learning environment. Bonnet (1997) added that available visual digital technology like animation, simulation and moving images, prevents passivity from students and strengthens their conceptual understanding.

Unlike Cox (1999), allowing students spend most of their time using ICT resources distracts them from focusing on the assigned work. Students believed that competencies (such as ethical, application, specialized, lifelong-learning, collaborative-work, etc.) can affect the use of ICT in learning environment. Davis (2000) therefore explains in deep the way ICT tools affects students learning and proves its access and approach that can be used to attain desirable level of education.

Effective use of ICT in education

ICT can be a powerful educational supporting tool when it is used for its purpose. Teachers use it to support traditional learning methods, like information retrieval in which students are passive learners of knowledge instead of active producers who are able to take part in learning process Galea (2002) explained how technology can promote teaching and learning by giving two main reasons behind increasing the use of ICT in learning in UK including changing the lessons‟ pace" and enhancing the quality of teaching and learning to help learners achieve better results.

Researches indicated that new technologies have lots of benefits on students. Galea (2002), for instance, proved that ICT allows for a higher quality lessons through collaboration with teachers and students when planning and preparing resources. Still new technologies reinforce independent and active learning, and students' responsibility. Passey (1999), highlighted that technology enable students feel more successful in school, motivated to learn more, to increase their confidence and self-esteem. According to Pedretti & Mayer-Smith (1998), students who learn in a technology-enhanced setting, found it more stimulating and much better than in a traditional classroom environment.

ICT in education is effectively used only when teachers are fully maximizing it for learning purposes, assisting students in the assessment of their personal learning to complete a specific project, and a motivation tool for new teaching and learning opportunities.

2.3.2 Enhancement of ICT in education

Enhanced ICT in learning increases the flexibility of learning delivery where students are able to access knowledge whenever at any location. Collins et. all. (1996), indicated that enhanced ICT contributes to creating adequate learning environments in various ways, offers opportunities to access needed information through multiple information resources, henceforhth fostering the authenticityof learning environments. In addition, it may make complex processes easier to understand through simulations.

Technology is a motivator which inspires the learner in skills acquisition and knowledge and improves teacher training capacity. Reeves & Jonassen(1996) noted that technologies are transformational tools which, when used accordingly, boost student's performance since there is a shift from passive to active class**.**They added thattechnologies have many and different learning pathways and

articulations of knowledge. It allows students explore and discover rather than merely listen and remember.

2.3.3 Students' perception on ICT use at school

Technology is an enabling tool to the learners as it helps them undertake assigned tasks when they work to achieve a certain goal. However, its misuse can generate risk factor that grows the probability of problematic consumption. This risk emanates from the abusive and incessant interaction. To mitigate the risks, it is deemed important to develop a model which fits the students' expectation and circumstances (Enos K, 2008).

According to Alaa et. al (2013), students need to feel the effective use of ICT adapted by the professor in the classroom and determine if the choice used in any course is similar to what facilities students' use on their own for academic purpose. This research goes deeper to analyze if the use of ICT in IPRC Kigali is helpful in students' learning environment.

Koegh, K. (2003), confirmed that learners demonstrate the perception they have when using ICT resources whereby they think it can help them acquire knowledge. They proved the difference between ICT learning which is more effective compared to traditional learning environment in which a free learning environment is enjoyed, communication which is less restricted, flexibility and more self-scheduled study plan. From this perspective, the researcher has focused on all students from different departments in IPRC Kigali.

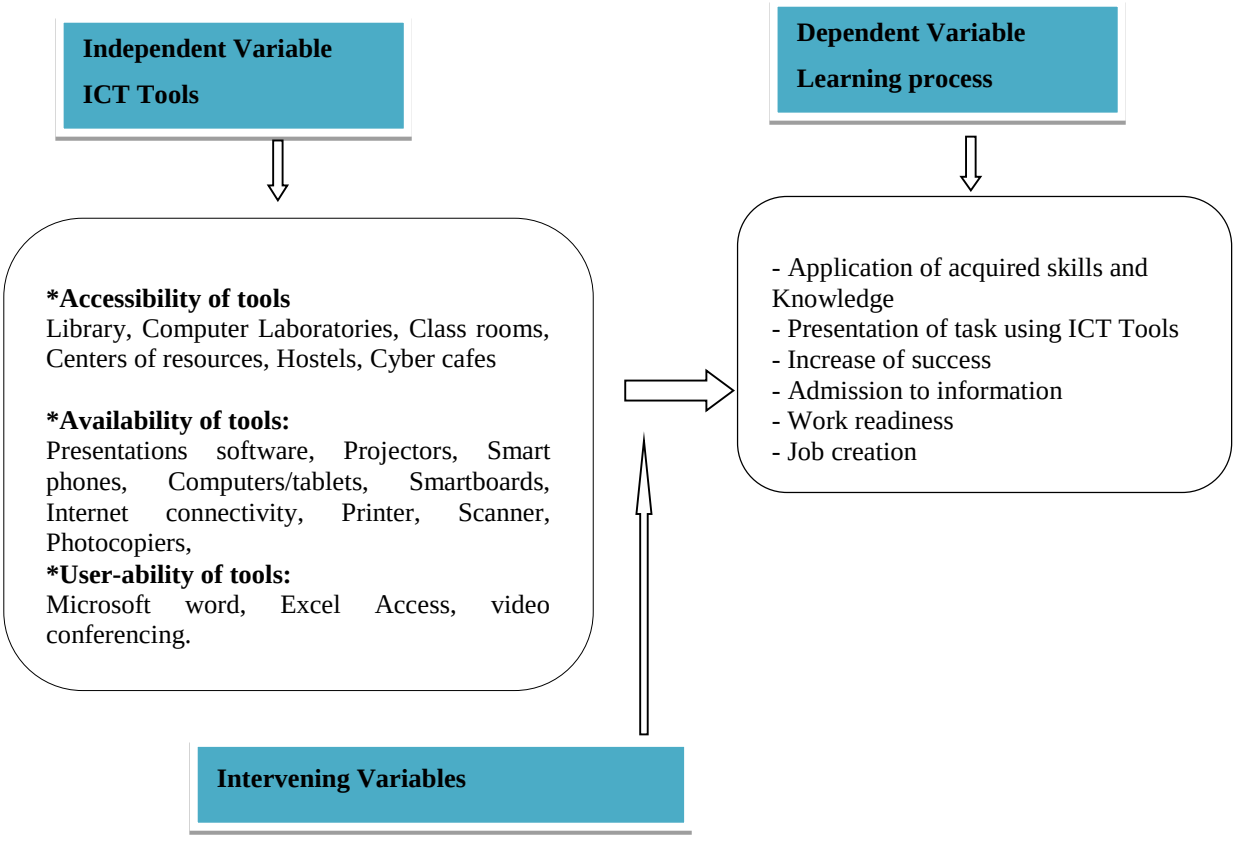
While extrapolating the benefits of using ICT, it was noted that students can use it for quick access to ICT applications and tools in order to enhance the strength of the research needed.

It also helps for time saving, access to information, and convenience of access to information. Students proved that inaccessibility of ICT resources can be viewed as the major factors affecting students' performance.

2.4 Conceptual framework

Conceptual framework is concerned with the identification of research variables to be measured. This research that examines student's perception towards ICT as a learning tool at IPRC Kigali seeks to evaluate the outcome of technology usage when learning. The conceptual framework below shows the impact of ICT resources to students' learning process.

Figure 2.3: Conceptual framework chart



Source: Researcher generated chart

Chart 2.3 describes the relationship between variables. ICT tools were conceived as independent variable, while learning process is dependent variable and there are also intervening variables. The conceptual framework was compiled to establish the relationship between variables.

Arrows that were used indicate relationship flow. Independent variable was operationalized by the availability of ICT tools (such as internet connectivity, computers, projectors, TVs, computer Labs, video conferencing, presentation software, Smartphone, smart board, printer, scanner, photocopier), accessibility of tools (Library, Computer Laboratory, classrooms, Resource centers, Hostels, cyber cafe) and the user-ability such as Microsoft Word, Excel, Power point presentation, video conferencing. On the other hand, learning process was considered with indicators like are increase of success, application of acquired skills, knowledge and attitudes, presentation of task using ICT tools, admission to information, work readiness, job creation as the outcome of the learning process and dependent variable whereas teaching methodology, students' behavior, readiness of other learning tools are intervening variables which also contribute to the learning process.

2.5 Summary of the chapter

Many studies explored the incorporation of technologies into instruction and some researches revealed that enhanced ICT plays important role in learning process on one hand while others asserted that incorporating technology into instruction does not come without challenges since ICT can have negative side effects such as creating distractions from the tasks at hand. The chapter reviewed theories of related researches, reviewed empirical and provides a conceptual framework on student's perception towards ICT usage while learning. It also considered related literature of similar researches for comparison purposes and expressed the expectation of students. Cognitive flexibility/theory provided by Mukama (2008) as interdependency and construction of human development processes was conceptualized to emphasize the integration of ICT in learning process with guidance in order to indicate the benefits of technology in learning while analyzing student's perception of ICT usage at IPRC Kigali where students' adaptation to technology would improve academic performance. Research variables such as independent, dependent and intervening variables were identified by the researcher to analyze students' perception of ICT usage for a stated outcome. Next chapter indicates the methodologies that have been used for this research.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides the methodology that has been opted while pursuing the study. It indicates research design, justification, sources of data that had been collected, sampling method, and procedure, population and sample selection, data collection instruments, data processing and analysis and limitations of the study.

3.2 Research approach

In conducting the research, inductive research approach was used as a flexible methodology which is human based. This enabled the researcher came up with qualitative and interpretive data as a way of guiding analysis and presentation of the research. Given that finding targeted respondents for the research was not easily made possible, guiding questions for interview were prepared in order to help students at IPRC Kigali who are research participants to provide sufficient and relevant and or/ reliable information.

3.3 Research design

As an outline, plan or strategy specifying the procedure to be used while seeking answers to research questions, descriptive survey design was used to determine students' perception of ICT use in learning activities, as the focus of the study. This involves both quantitative and qualitative data collection. The central role of the research design is to minimize the chance of drawing incorrect causal inferences from data. To get in depth response from respondents, individual and group responses of students in polytechnic were used then organized, tabulated and described for data collection. The approach of small groups and individuals were organized in comfortable environment to extract views from students. Qualitative data that was collected include the ones obtained from interview schedules, past researches, books, internet, and journals.

3.4 Setting and Population study

The study was conducted at IPRC Kigali and targeted 3,584 students in advanced diploma program in five departments. IPRC Kigali was chosen as the focus of the study because it is the first established polytechnic in Rwanda, and based on their innovations in technology which were exhibited, the researcher has sought to analyze the use ICT in learning activities.

3.5 Sample size and Sampling techniques

The study was conducted at IPRC Kigali and was based on a simple random sampling method targeting advanced diploma students totaling to 3,584. The sample size has been determined by taking into account the duration, the cost of the study and the acceptable representative sample size.

Therefore, Slovin's formula has been applied to determine a tolerable sample size in a given population with the tolerance error where the standard of accuracy or the 95% level of precision was kept high, and 5% margin of error value has been considered as the formula indicates:

$$\boldsymbol{n = \frac{N}{1 + Ne^2}}$$

Where: **n** is the sample size, **N:** is the population size from which a sample size was selected. **e:** is the margin or sampling error estimated at 5%.

Table 3.1: Sample and error estimation

	Number (N)	**$(e)^2$**	**1+N $(e)^2$**	**n (Sample)**	**Interviewed(5% of n)**
Students	3,584	0,0025	9.96	359.839	18

The total sample size is rounded to 359 students. For qualitative data, these students were supposed to be interviewed. But due to time constraints and financial means, only around 5% of respondents (372*0.05=18) equivalent to 18 students for guide interviews (one-on-one) was considered as the true representative sampled population in this research. Focus group discussions were used to enable students give their views through interview.

3.6 Research instruments

During the course of the research, various sources and tools were combined as primary and secondary data forms. Structured observation was carried out after the selection of research variables. During this process, the researcher took into account participants, their behavior, environment where it would take place as well as any physical movements or symbols that could influence the research. Researcher has also opted to individual and/or group interviews which were administered and included open-ended and closed-ended questions that requested respondents as target population to give their views on the use of ICT at IPRC Kigali. In addition, interviews, observation and focus groups were combined in order to enhance the credibility of the study.

3.7 Data collection techniques

By the help of a research assistant, interview schedule was planned according to interviewee's convenience. Guiding questions have been prepared for the interview process to enable the flow of information from interviewees.
During the research process, field visit was conducted in five departments for monitoring purposes.

The main techniques that were used in this research include:

3.7.1. Documentary technique

According to Witkin &Altschuld, this technique consists in reviewing existing sources. Through documentary technique, the researcher consulted books, reports, journals and websites related to technology in education.

3.7.2. Interviews

Interview technique was used for data collection. Qualitative method has been used since it has been conducted at the research site. The method enabled the researcher understand the meaning of what is going on at the site. Interview and semi structured interview were utilized because the research was focusing on IPRC Kigali students, and was collecting qualitative data to verify the developed study theories.

3.8 Data analysis techniques

In data analysis techniques, both qualitative and quantitative methods were used to describe and interpret research data statistically. Considering that observation, interviews and surveys were used during data collection process, narrative analysis was used whereby collected data were analyzed according to their magnitude. This helped researcher got a general idea from different points of views about the researched subject. In some cases, respondents' comments were quoted. The responses from the structured questions were computed into frequency counts and percentages, summarized and tabulated for easy presentation, assessment, analysis and interpretation. In this regard, data collected had been edited, coded and put in in tables as meaningful information for easy interpretation and understanding. This was done through editing, coding and tabulation in order to assess their qualitative and quantitative accuracy.

3.9 Ethical consideration

Since the researcher expected to carry out a study with public institution, especially a public polytechnic (IPRC Kigali), this prompted the researcher to seek authorization from Polytechnic for allowing collect data accordingly. The researcher has also been prompted in designing the interview guide that would not hinder the flow of information from respondents. The gathered information was treated individually and confidentiality was ensured. After setting up a program for meetings, researcher started interviewing them one by one in their respective places. The information given is supposed to be used for the purpose of this research only.

3.10 Research validity and reliability

Before undertaking the actual study, research instruments were checked for validity and pre-tested to determine their reliability. To establish the validity, statisticians advised the researcher in evaluating the relevance, conciseness, intelligibility and clarity of questions. Advanced diploma students were the relevant subjects for the research; to interview. Relevant documents have been obtained from the Institution. Reliability was also considered in order to ensure the degree of consistency and stability. Henceforth, it involved the examination of frequencies when the researcher would be checking for the reliability in relevancy, clarity, and ambiguity of items in the instrument.

Therefore, a pilot study was conducted in Civil engineering as one of the five departments found in Integrated Polytechnic Regional College, Kigali. During the pre-test, 9 respondents were involved. This pilot study helped in detecting any major challenges that are likely to result from research instrument applied.

3.11 Summary of chapter three

The chapter covered the introduction of the study methodology whereby a research approach, design, population, sample size, sampling techniques, and instruments, techniques for data collection and analysis, ethical consideration were identified. It also provided the research validity and reliability.

CHAPTER FOUR: PRESENTATION OF FINDINGS

4.1. Introduction

The chapter presents research findings related to students' perception on the use of ICT in Polytechnic from IPRC Kigali, Advanced diploma program. Data used were collected through interviews administered to students. Interview guides prepared in the language that can easily be understood by the interviewee (Kinyarwanda) were later on translated in English.

4.2. Analysis of Respondents 'Bio-data

In order to assess students' perception on the use of Information and Communication Technology at IPRC Kigali, eighteen (18) students selected randomly from five departments were interviewed. Demographic characteristics selected for the study were: Gender and age group.

4.2.1. Characteristics of respondents by gender

This table shows the characteristics of the respondents according to their gender.

Table 4.2: Analysis of Respondents by Gender

Gender		No. of respondents/Frequency	Percentage
Female		8	44.5%
Male		10	55.5%
Total		**18**	**100%**

Source: Field Survey, 2017

The table 4.2 indicated that majority of respondents were males as indicated by 10 (55.5%) compared to 8 (44.5%) of females. This translates a number of males which is higher than the one of females in IPRC Kigali. It also translates gender participation in the research.

4 .2.2. Characteristics of respondents by age

The study collected background data in order to ensure the authenticity of the respondent with the study area and study variables since their characteristics can influence the nature of participation and opinion.

Table 4.3: Analysis of Respondents by Age

Age group	No. of respondents/Frequency	Percentage
15-20years	6	33.00%
21-25years	8	44.50%
Above 25 years	4	22.50%
Total	**18**	**100%**

Source: Field survey, 2017

Table 4.3 revealed that 6 respondents constituting 33.00% fell within the age range between 15 and 20 years, 8 respondents constituting 44.50% are between 21 and 25 years old while 4 respondents, that is 23.50% are above 25 years old.

4.2.3 Distribution of age according to gender

Table 4.4: Age Distribution

Age group	**Male**	**Female**	**Total**
15-20 years	2	4	6
21-25 years	6	2	8
Above 25 years	2	2	4
Total	**10**	**8**	**18**

Source: Field survey, 2017

Table 4.4 revealed that 2 male and 4 female respondents constituting 33.00% fell within the age range between 15 and 20 years, 6 male and 2 female respondents constituting 44.50% are between 21 and 25 years old while 4 respondents made of 2 male and 2 female respondents composing 23.50% of the total respondents (18) are above 25 years old.

4.3. IPRC's students' perception in using ICT tools for learning activities

To know the perception of students of using ICT tools for learning activities in IPRC Kigali, the analysis of questions addressed to respondents were deemed necessary. This section is organized according to respondent's knowledge on technological tools, the accessibility of technological tools and their role, effectiveness of technological tools for learning purposes. To analyze students' perception on the subject, opinions provided by respondents according to age were also considered.

4.3.1. Knowledge of technological tools.

The table below indicates different technological tools that can be used in learning based on students' knowledge.

Table 4.5: Technological tools/resources used in learning in IPRC Kigali

Tools	**Distribution**			**Percentage**
	Male	**Female**	**Total**	
Presentation software	4	4	8	44.40%
Projector	4	6	10	55.55%
Smart phone	10	8	18	100%
Computer/tablet	10	8	18	100%
Smart board	4	3	7	38.88%
Social media	6	7	13	72.22%
Text processing software	5	3	8	44.40%
Spread sheet software	3	3	6	33.33%
Internet connectivity	9	8	17	94.44%
Email	9	7	16	88.88%
Printer	5	6	11	61.11%
Scanner	7	6	13	72.22%
Photocopiers	4	5	9	50.00%
Image sharing sites	3	5	8	44.40%
Total	**10**	**8**	**18**	**100%**

Source: field survey, 2017

The table 4.5 revealed that respondents know some technological tools used in learning activities. It was presented based on gender distribution whereby male and female students participated in the research accordingly. More than 50% of respondents revealed the most used tools like smart phone, computer, internet connectivity, social media, email, scanner, printer, projector, and photocopier while less than 50 % indicated the least used tools such as image sharing sites, text processing software, presentation software, smart board, and spread sheet software.

4.3.2. Accessibility of technological tools/resources and their role.

In exploring students 'perception on using ICT tools in learning activities, the research sought to assess tools that are accessible for students as reported by the targeted respondents as follows:

"*Here we have many ICT resources like computers, internet connection (wireless), projector, some computer application, E-library, camera, scanner, printer and others, but what are accessible at the same level. The most accessible resources in our days are like internet connection (wireless) which is available everywhere also computers are available".*

The availability of technological tools necessitate knowledge of their role in the learning process as the table below shows respondents' views on the role of accessible technological tools in IPRC Kigali.

Table 4.6: Role of technological tools/resources in IPRC Kigali

Role of tools	Frequency according to age				Percentage
	15-20 years	21-25 years	Above 25 years	Total	
Help in research	3	6	3	12	66.66%
Taking note	2	5	2	9	50.00%
Lecture records	2	3	3	8	44.44%
Picture taking	6	2	1	9	50.00%
Calculation	3	2	2	7	38.88%
Communication	5	7	4	16	88.88%
Presentation of work	3	6	2	11	61.11%
Enabling tool to practice and deepen knowledge	4	7	3	14	77.77%
Help understand real-world	5	8	3	16	88.88%
Help understand course information	4	6	3	13	72.22%
Increase interest in the course	6	7	2	15	83.33%
Total	**6**	**8**	**4**	**18**	**100%**

Source: Field survey, 2017

From table 4.6, the study indicated that the predominant role of technological tools for students is Communication and understanding real world as represented by 88.88%) of respondents, increase interest in the course reported by 83.33%, Enabling tool to practice and deepen knowledge reported by 77.77% of respondents, Help understand course information as reported by 72.22% of respondents. Other roles include note taking, presentation of work, taking notes, taking pictures, and lecture recordings.

Other common use of ICT includes developing material to prepare their modules (e.g. classroom presentations); doing administrative work (e.g. compiling students' data, typing assessment tasks and feedback etc.); to facilitate students' learning in a classroom; and teacher directed use of ICT to complete the assigned tasks, as reported by some of the respondents. The same table 4.5 indicated that the opinions of old respondents on the role of available ICT resources are higher than the ones of young respondents as indicated as follows:

Out of 12 respondents who argued to use available resources in research, 9 are old respondents (6 of 21-25 years and 3 of above 25 years); 9 respondents who reported to use ICT in taking note; 7 are old while 2 are young; 8 who argued to record lecture, 6 are old while 2 are young respondents; 9 for picture taking, 3 are old compared to 6 young; 7 for calculation whereby 4 are old while 3 are young; 16 for communication where 11 are old compared to 5 young; 11 for presentation of work whereby 8 are old and 3 young; 14 for Enabling tool to practice and deepen knowledge in which 10 are old respondents and 4 young respondents; 16 for Help understand real-world where 11 respondents are old while 5 are young ones; 13 for Helping understand course information in which 9 are old and 4 young respondents; and 15 respondents who reported that ICT increase interest in the course, 9 are old while 6 are young ones.

4.3.3. Effectiveness of technological tools for learning purposes

To explore the perception of students in using ICT for learning in IPRC Kigali, views and opinions on effective use of technological tools for learning were collected. Students reported about the level of their ICT usage in their courses. They gave their opinions regarding its effectiveness and ineffectiveness during the course delivery as some of the following respondent confirmed:

> *"Technology was used effectively in the class one day when our lecturer was showing us vide and photos using projector. The module was understandable".*

It can also be ineffective as argued by the following respondents*:*

"*There was a time one student was using whatsApp while in class and it was clearly that he was not following the lecturer. Others were also opening internet and watching movies."*

Other respondent also reported the following:

" *Lecturers use the following technologies effectively: Presentation Software, Text processing software, projector, smart board, Spreadsheet software, printer, photocopiers and other. It is important to note that these technologies that students find most effective tend to compare with those that they desire most and that lecturers commonly use. The data seems to suggest a positive connection between effectiveness of technology, its desire to be used, and its overall use."*

4.4. Ability of using ICT resources by a student in IPRC Kigali

This research seeks to know if students in IPRC Kigali can drive themselves in the use of ICT without the intervention of lecturers. Confidently, Rugwiro reported that*:*

"There are technologies we use on our own like Facebook, WhatsApp, and Electronic library resources, Google documents, twitter, mobile apps, image sharing site, emails and others."

In the same way Kayitesi argued as follows:

" *Our own electronic devices used in the classroom are for taking notes, looking up information relevant to lecture, and recording lecture, making research when I was given assignment, sending communications to others, using social media, calculations and taking pictures."*

Basing on the testimonies, it is evident that students are getting used to using ICT resources at their disposal. These seem to indicate that students have an understanding of what sorts of uses are socially acceptable in a classroom setting.

4.5. Effect of user-ability of ICT resources on student's learning.

Students' perception on the use of ICT has also been explored based on the effect of the user ability. Variable like teaching method, student's attitudes, availability of other learning tools, and level of intelligence were taken into account.

Table 4.5 illustrates different views on how the use of ICT can affect students' learning according to the indicators set out by the research.

Table 4. 7: Effect of ICT use in student's learning

Evaluation indicators	Frequency	Percentage
Increase of academic performance	16	88.88%
Application of acquired skills and knowledge	15	83.33%
Performance of task using ICT tools	18	100.00%
Accessibility of information	18	100.00%
Work readiness	9	50.00%
Increase the level of intelligence	12	66.66%
Teaching method	16	88.88%
Change student's attitude	11	61.11%
Availability of other learning tools	14	77.77%
Codification of knowledge	13	72.22%
Total	**18**	**100%**

Source: Field survey, 2017

Information provided by table 4.7 revealed that among 10 indicators set out to assess the effect of ICT use on students' learning, it indicated that 3 indicators: increase of academic performance, performance of task using ICT tools, and access to information represented by 100% of the respondents (18), while the remaining 7 indicators like teaching method (88.88%), application of skills and knowledge (83.33%) , availability of other learning tools (77.77%), codification of knowledge (72.22%), increase the level of intelligence (66.66%), change student's attitude (61.11%) and workplace preparation (50.00%) were also reported respectively.

In analyzing students' perception of ICT usage in learning, the study sought to investigate if the use of ICT can have a positive or negative effect on students' learning. In this perspective, the following respondent testified as follows:

" *As a student in civil engineering, when I was in year one, we were used to preparing our drawing projects using traditional method (pens, pencils, rulers, erasers, dummies) before we were exposed to technology. Given that I was not good at drawing, the presented drawing projects got lower marks and I failed that subject and was required to retake the course until I got required marks to be promoted to the following year. When I entered year two, we started using technology in almost all subjects we learn and my academic performance was improved because I got better marks. I therefore find technology beneficial to student because it helps us succeed when we use it accordingly."*

The effect of technology to student's learning was reported by the following respondent*:*

"Technology enabled me improve my academic performance because when I am given an assignment, I use technology to look for information to use when doing my assignment and then use ICT to perform tasks given. This reduces the time of going to library to consult books, reading them and then write down read information, and then submit the assignment which sometimes were time consuming." The reduced time is thus spent reading for other subjects."

4.6. Suggestion on ICT resources usage to meet students' expectations

In this research, students were asked their expectations when using ICT after their studies. One participant reported:

"*I expect to use ICT in taking pictures, taking necessary notes, in calculations, in recording, looking up to information relevant to job, checking communications from others, using social media, sending communication to others, making research and other different activities."*

Most of the respondents revealed their expectations in using ICT resources as follows:

"After studies I expect to use ICT for communication with others, searching for a job using internet connection, creating my own job, making research to get current information."

To improve the use of ICT in learning activities in order to serve its purpose, different suggestions have been given by the respondents in order to enable the involved stakeholders play their role effectively.

Table 4.8: Suggestions on how to improve ICT use in learning activities

Suggestions	Frequency	Percentage
Increase of ICT resources for easy access	18	100.00%
Using ICT for its purpose	16	88.88%
Total	**18**	**100%**

Source: Field Survey, 2017

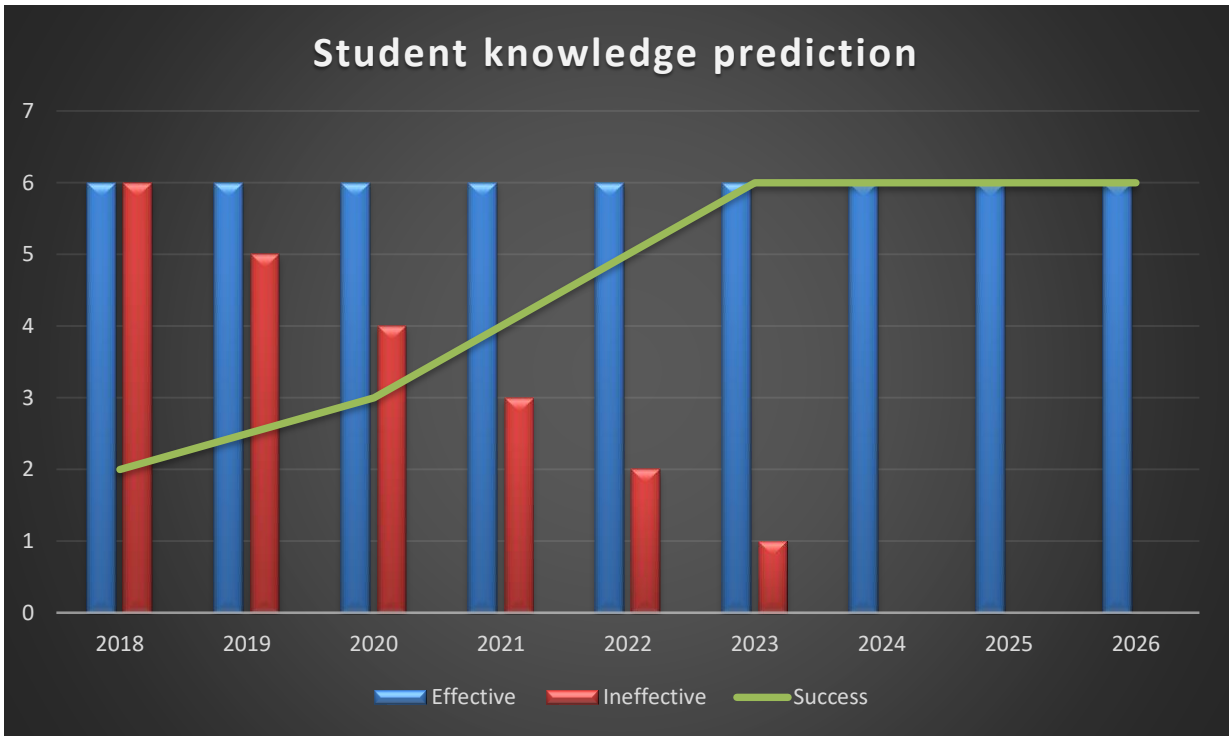
Information from table 4.8 reveal that 100% of respondents suggest the increase of ICT resources for easy access to all students while 88.88% of respondents suggest the use of ICT according to the purpose.

4.7 student's knowledge Prediction

Based on research findings, the study come out with below graph which shows the increase of knowledge in IPRC according to time.

The graph proves that if the level of success in IPRC is currently at a certain percentage, this will reach the level where every student who implement the recommendations provided in this research will succeed in their studies.

Figure 4.4: Student knowledge Prediction graph



Researcher generated, 2017

The graph 4.4 indicates that effective technologies (in blue) and ineffective technologies (in red) are at the same level in the first year (2018). The graph suggests that after six years (starting from 2018-2023), the ineffective use of technologies will no longer exist in IPRC Kigali. This translates the decrease of ineffective level of ICT use as years go by as the level of knowledge goes higher, hence the increases of success.

4.8 Summary of the chapter

This chapter presented all recorded research findings related to students' perception on ICT use while learning in Polytechnics specifically IPRC Kigali. Findings showed effect of the use of ICT resources in learning environment. Respondents demonstrated with eagerness the use of these resources and impact that it can bring towards their success in learning.

CHAPTER FIVE: DISCUSSION

5.1 Introduction

This chapter analyses and interprets the results of the study and the results are presented into the following three themes:

Theme 1: ICT resources in learning environment
Theme 2: Accessibility of ICT resources in IPRC Kigali
Theme 3: Ability of using ICT resources by a student in IPRC Kigali.

5.2 ICT resource in learning environment

In exploring students' perception on the use of ICT resources in learning environment, most respondents (8 females and 10 males) explained in details the use of ICT resources in their learning environment. They revealed that their lecturers use ICT materials in different modules.
The study revealed the most used ICT resources being smartphone, computer, social media, internet connectivity, email, scanner, projector, smartboard, printer, and photocopier. The least used ICT resources were image sharing sites, text processing software, presentation software and spread sheet software

It is evident that there are two categories of ICT technologies usage. The first category is composed of data presentation technologies such as Presentation Software, Projector, Smart board, Text Processing Software and Spread sheet software used by lectures to meet student expectations and beyond. Therefore, at this first point, IPRC Kigali is meeting student expectations.

The second category is composed of social media, Internet connectivity, printer, scanner, photocopiers and images sharing sites.

This suggests that the students' expectations obviously exceeded the lecturers 'usage rate in this category. It translates a big gap in improving the usage of these technologies in classroom. It is also important to note that students tend to expect the technologies that are in usage by other classes.

For example, if a student sees that scanner is being used in two of their classes, they might expect their other classes to use scanner as students are studying in different departments like Civil Engineering, Electrical and Electronics Engineering, Mechanical Engineering, Information and Communication Technology and Mining Engineering.

From these expectations of students in the use of ICT in their daily activities, it is very important that lecturers should adapt new technology in their teaching to help students to gain the maximum as possible. As more lecturers incorporated the other kinds of technology, there will be the desire of students and the increasing of incorporation for each of these technologies. It would be worth investigating whether a large group of lecturers starting to use a new technology causes more students want to use that new technology.

5.3 Accessibility of ICT resources in IPRC Kigali

In assessing students' perception on the use of ICT resources in IPRC Kigali, research sought to investigate if technological tools are accessible in the learning environment and how they are used. The study revealed the availability of ICT resources as confirmed by all respondents (100%). This availability translates its role which include communication, note taking, heling in research, picture taking, help in understanding real-world reality, lecture recording, calculation, presentation of work, enabling tool to practice and deepen knowledge, help understand course information, increase interest in the course. Demographic characteristics revealed that both girls and boys, whom their age distribution played an important role in the research, their opinions influenced the result at a greater degree. The study found out that the opinions of older respondents (respondents of age range between 21 and above 25) are far beyond the opinions of respondents ranging between 15 to 20 years old. This translates that the old respondents are mature enough to cope and are more cautious in terms of success management. On the other hand, the opinions of young respondents are lower because they feel distracted when using technology and fail to manage their academic performance.

ICT resources are not only accessible to students but also to lecturers who use them in modules preparations, administrative work, facilitating students in learning in classrooms. The researcher found out insufficiency of ICT resources compared to the number of users where students are required to bring their own resources to complement the institutional resources.

The study equally explored the effectiveness of ICT use in IPRC Kigali where it revealed some resources which are used effectively when used in course delivery to enable student understand more and increase knowledge. Ineffective use of ICT resources was also found out by the researcher when students use them to divert the course like chatting, movie watching, and picture taking.

5.4 Ability of using ICT resources by a student in IPRC Kigali

The research findings revealed that students in IPRC Kigali have the ability to use ICT resources at their disposal without intervention of lecturers as confirmed by almost all respondents who argued to use Facebook, WhatsApp, and Electronic library resources, Google documents, twitter, mobile apps, image sharing site, emails and others in taking notes, looking up for information related to lectures, lecture recording, making research when given assignment, communicating with others. This translates a deep understanding of what sorts of resources that are socially acceptable in a classroom setting.

It is understood that now students are getting used to using devices such as laptops and tablets for taking notes. Similarly, it was found out that some students might want to read the textbook and other materials using their tablets and other devices.

Interestingly enough, very many participants reported that using social media and checking communications from others were their appropriate technology in class. This tends to make sense given that these items are commonly thought as leisure time activities. It was also found out that students that use ICT in learning tend to have higher grade.

The study indicated that students who use ICT effectively in their learning expect to use it for communication with others, searching for a job using internet connection, creating my own job, making research to get current information.

5.5 Students performance increase

The research predicted the increase of knowledge if all suggestions from students are implemented in IPRC Kigali. This prediction found out in (fig. 4.4) that there will be a big impact on students learning if the integration of the guided technology is effectively taken into consideration. Students' opinions will be the key success for IPRC Kigali to improve the education. ICT resources have been approved by students to direct their success. Based on research findings, the study come out as indicated with the graph (fig. 4.4) the increase of knowledge in IPRC according to time. Since 2018 students of IPRC Kigali were not knowledgeable about the use of ICT in learning. Therefore, the effective and ineffective use of ICT were both at the same level (level 6). The graph predicts that by the 2024 all of students will use the ICT effectively and this contribute to the success of students.

5.6 Summary of the chapter

This chapter presented research outcomes related to students 'perception on the use of ICT in learning at IPRC Kigali. Research findings highlighted that the use of ICT resources in learning environment leads to students' success. The study showed that gender and age participated in this research and have contributed at same percentages.

Participants of this research were categorized based on different stages of their ages. Discussions demonstrated that the use of ICT when learning at IPRC Kigali will contribute to the increase of success in the institution. The chapter presented the level of success based on the ineffective and effective technologies that can be used at IPRC Kigali.

CHAPTER SIX: SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 Introduction

This research comes with a conclusion which has a summary of the discussions in previous chapters. It gives the recommendation for further research related to this topic in order to increase the capacity of education with the integration of ICT.

6.2 Summary

Technology can be a good tool to drive education to the top level. ICT has been distinguished in the development of different areas. The research aimed at understanding and analyzing students' perception at IPRC Kigali when using ICT in their learning. The study found lack in maximizing the use of ICT in education which leads to many practices and demonstration of real world object in students' environment. This research found ICT as an enabling tool for students to increase the academic performance of students, perform some tasks using computers, have access on information, increase the level of intelligence, take notes, communicate, make research, record lecture, take picture, calculate, looking for information, practice and deepen knowledge, help understand course information, increase interest in the course, and more importantly help in job search and job creation after studies.

This research has come out with different expectations from students in IPRC Kigali. Students demonstrated all ICT resources that are used in effective way during their learning like presentation Software, Projector, Smart board, Text Processing Software and Spread sheet software. In these technologies lecturers satisfy the need of students' requirements. While other technologies like Social media, Internet connectivity, Printer, Scanner, Photocopiers and Images sharing sites; data showed that the students' expectations obviously exceed the lecturers' usage rate.

This research found that few ICT resources such as Computer, Internet connectivity, projector, computer applications, E-library are accessible by students but there are not enough computers for most students which was regarded challenging.

6.3 Conclusion

The result of the research showed that different ICT resources are used by students by their own like Facebook, WhatsApp, Electronic library resources, Google documents, twitter, Mobile apps, Images sharing site, Email, blogs. However, they agreed that the available ICT resources were not utilized due to lack of technical support as well as lack of enough power supply and some major ICT resources.

Based on major findings of this research, students perceived that the availability, accessibility and ability to use ICT resources for teaching in IPRC Kigali is in good position. However, students, lecturers and IPRC administration need to make some improvements regarding the equipment. Students need to improve their use of ICT resources as much as possible during their learning in order to maximize their success. Students demonstrated also the impact of ICT even after their graduation. This research would help IPRC Kigali to improve the quality of teaching based on the students' expectations that have been cited. Finally, students quoted that there are enormous benefits which could have gone a long way in raising the fallen educational standards and fitting in Government vision about ICT which has comparative advantages compared to surrounding countries.

6.4 Recommendations

Based on findings and in line with study objective, some recommendations have been formulated and are addressed to the Government, IPRC Kigali and students.

1. The Government should endeavor to mobilize sufficient funds to procure adequate ICT related resources. Otherwise institutions should appeal to business organizations within the institution's locality for either financial or material resources.

2. Workshops, seminars, and comprehensive training and re-training programmes on ICT resource utilization should be organized by institutions for Office Education Lecturers in IPRC Kigali to enable them gain current knowledge of the resources.

3. Students should motivate themselves to use ICT resources at their disposal to gain as much as possible during their time in IPRC Kigali. This will help them to shine in the new world which is driven by new technologies in different fields.

6.5 Suggestions for further study

During the study, students 'perception on the use of Information Communication Technology in Polytechnics using IPRC Kigali as a case study, was examined. Based on the limitations, the researcher wishes to suggest empirical studies in the following areas:

a. Lecturers' perception on the use of ICT in High Learning Institution.

b. Influence of Availability, Adequacy, and Utilization of Information and Communication Technology Resources on Teaching Office Education in Public Polytechnics in Rwanda.

c. Students' and Lecturers' perception on the use of ICT for learning in Private Polytechnics in Rwanda.

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APPENDICES

APPENDIX I: LETTER FOR RESPONDENTS

Dear respondent**,**

I am a Master's Student from UNIVERSITY OF RWANDA-College of Education carrying out a research on **"Students' perception on the use of ICT in polytechnics''** as a partial fulfillment for the requirements for Award of Master of Education in Curriculum Development and Instruction.

To ensure validity and reliability of data, you are kindly requested to answer the questions as truthfully as possible and according to your independent opinion. You may or may not disclose your name. I ensure you that your answers to the questions will be treated with strict confidence.

Your cooperation is highly appreciated.

Aimable RWAMASIRABO

APPENDIX II: STUDENTS' INTERVIEWS

Interview questions

1. What is your gender? ……
2. How old are you? ……
3. For this semester, in general, what kinds of technology do your lecturers use in your class?
   ……
   ……
   ……
4. Do those ICT resources are accessible for you to use?
   ……
   ……
5. Does utilization of those ICT resources by students in learning is effective? Explain
   ……
   ……
   ……
6. What kinds of technology would you like your lecturers use that would better support the curriculum/course material?
   ……
   ……
   ……
7. In general, do the lecturers allow you to bring your own ICT resources in class?
   ……
   ……
8. What do you feel are the appropriate uses of ICT resources in the classroom?
   ……
   ……

9. What do you expect ICT will help you after your studies?

……

……

10. Would you like to share a time where technology was used effectively in the classroom?

……

……

……

11. Would you like to share a time where technology was not used effectively in the classroom?

……

……..

12. What are your expectations of from the use of information communication technology resources in learning?

……

……

……

13. a. Explain any support you may have received from your teacher in line with ICT in your learning

……

……

……..

14. b. Explain any support you may have received from your classmates in line with ICT in your learning

Thank You!