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ICT Integration in Educational curriculum in Higher Education: Challenges and opportunities in the University of Rwanda-College of Education

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Abstract

Information and Communication Technology is significantly relevant in all domains of today's economy specifically in higher education. In this study, the researchers wanted to identify the opportunities and challenges available in the ICT integration with particular interest in educational curriculum at the University of Rwanda - College of Education. Framed on Constructive theory, the study is not only descriptive but also quantitative as it includes some quantifiable information. Using Yamane's table of sample determination; 150 respondents were selected from 1984 people. Questionnaire, observation and focused discussions were used as research instruments. Results disclosed a range of ICT opportunities such as computer laboratories, loudspeakers and microphones, internet, projectors and personal mobile phones among others. As to how those resources are used profitably; findings revealed the provision of online assignments; urging students to use social networks responsibly especially for academic purposes, using personal computers, projectors, audio equipment and internet sharing in their daily practices of teacher - education journey. The identified challenges affecting effective integration of ICT in education include insufficiency of computers, limited skills of using ICT resources; slow network; big class size and for lecturers' overload, among others. Findings also revealed that there is a need for provision of enough computers to students; increase of connectivity and other ICT infrastructure; reduction of lecturers' workload and number of students in one classroom; train people in ICT usage and design a dual - mode policy to allow students and lecturers to use it as an accepted way of learning paired with the normal face to face method.

***Keywords*— Higher Education; University of Rwanda; ICT integration; Curriculum Education; opportunities, Challenges, Remedies.**

I. BACKGROUND OF THE STUDY

Currently Information Communication Technologies (ICTs) are influencing every aspect of human life. They are playing salient roles in work places, business, education, and entertainment. Moreover, many people recognize ICTs as catalysts for change; change in working conditions, handling and exchanging information, teaching methods, learning approaches, scientific research, and in accessing information (Fisseha, 2011). ICTs contribute significantly to changes in teaching practices, school innovation, and community services. ICT is becoming an integral element for educational reforms and innovations in current society, and our education is reaching an age of e-education. The increasing profile and importance of the use of information and communication technologies (ICTs) in the education sector are visible in many developing countries (Zhiting & Hanbing, 2001).

On the one hand, what is significant in the modern education is that emphasis is put on making learners active so that learning is shaped by them, therefore transformation of information from teacher to student is rejected; the teacher is the one who just facilitates learning and students themselves experience and analyze the meaningful and noble learning (Tavasoli, 2003). Dawes

(2001) as cited in Bingimlas (2009) is of the view that new technologies have the potential to support education across the curriculum and provide opportunities for effective communication between teachers and students in ways that have not been possible before. ICT in education has the potential to be influential in bringing about changes in ways of teaching. Currently, ICT has become a key agent in the development of any country and especially in educational systems and various educational institutions. In this regard, ICT can play various roles in learning and teaching processes. That view was supported by various researchers like (Iding et al., 2002; Shamatha et al., 2004; Romeo, 2006; &Wong et al., 2006) who argued that technology can play a part in supporting face -to - face teaching and learning in the classroom and also help students to become knowledgeable, reduce the amount of direct instruction given to them and then give teachers an opportunity to help those students with particular needs.

As a big educational institution, the University of Rwanda has got various opportunities as for it not to be left out in this competitive world of emerging technology. But this task of integrating ICT in teaching-learning process is not an easy and mere activity to be done in a single day; it is therefore a long process that requires effort from different stakeholders in the University.

In addition, despite having opportunities and being a complex process to be carried out, one may encounter various challenges that can be regarded as barriers to the implementation of this integration. In the same line , the University of Rwanda College of Education has also judged better to use ICTs in order to help its clients or beneficiaries benefit from an easy, quick and updated education and services at large. As examples, the researchers can mention the use of online teaching - learning in the post graduate programs, various student services offered online and the integration of ICT in daily courses.

This research now sought to throw light on the opportunities and challenges in the implementation of ICT integration in the educational system of the University of Rwanda - College of Education, very specifically in the curriculum part or in teaching-learning processes. It involves how students and lecturers do profitably use those opportunities to successfully achieve their educational objectives through the use of technology and how they carefully deal with any challenges in that domain to rectify them for the services to be delivered safely and fruitfully.

Statement of the problem

As the world is rapidly changing from analog to digital technology, the mode of delivery in higher education system needs to change in order to adopt current trends. In its 2020 vision and economic development and poverty reduction strategy (EDPRS II), Rwanda has adopted a strategy of basing economy on its people as the main source of development and with much emphasis on technology. It is in this regard that the University of Rwanda - College of Education, as a big college that trains qualified teachers - facilitators of knowledge; has also initiated an online program for its postgraduate students and integrated ICT in other programs in order to apply and encourage the use of technological teaching - learning methods for the graduates to survive in this challenging and technological world. Today students, especially post - graduate ones are provided with a teaching - learning platform where they easily follow their courses, do their course works and interact with their respective lecturers while being in their respective homes or work places. However, they still attend classes regularly and use the lecturing methods where lecturers give various lectures and students participate actively in their lessons. On the other hand, student - teachers following lecturers in classrooms only assist to some lecturers integrating ICTs in their teaching - learning practices but are not shown or encouraged to use them too. Throughout this study, a thorough assessment of the challenges and opportunities was made to evaluate how such opportunities are profitably used and challenges met are effectively addressed for that integration to be more helpful and productive to the beneficiaries. The study also explored how lecturers inspire student - teachers to use ICT in their teaching - learning practices. In this regard, some more strategies were argued out for the better improvement of the services and even for the extension in other colleges of University of Rwanda (if need be) and later on benefit the rest of Rwandan students for them to acquaint with new technological world.

Aim and scope of the study

ICT has become an engine that speeds up the development in many life domains education included. Integrating it in Higher Education is associated with challenges and opportunities which need be examined. In this study, the researchers wanted to find answers to the following questions :(1) what opportunities can UR - CE lecturers and students utilize in the ICT integration in education? (2) What are the challenges that lecturers and students face in using ICT? (3) How do they maximize those opportunities to make teaching - learning a success? (4) What are strategies to overcome the identified challenges for the teaching - learning to be more fruitful? Thus, this study was carried out from January to July to investigate ICT Integration in Educational curriculum in Higher Education with particular focus on challenges and opportunities in the University of Rwanda - College of

Education. The researchers deemed this study significant in that if challenges and opportunities were identified, it would benefit lecturers and other educational curriculum implementers in one way or another. First, they can know and give value to what they perceive as opportunities to serve their customers. In addition, when they are aware of the challenges, they would work accordingly and adopt new ways of overcoming barriers for the services to be better delivered in order to reach the efficient use of ICT in educational curriculum. It would also benefit students in a way that they will discover more ICT opportunities to explore and how they will overcome challenges militating against their effective learning. Further, the college community will identify and understand their role played in the implementation of ICT to facilitate them in the fulfillment of their responsibilities for each. Last but not the least important, this study is to guide administrators and UR officials to get the nature of things on how ICT is being integrated in the educational curriculum. If this is known, planning will be improved and revised so as to better incorporate the ICT efficiently in the teaching-learning process.

II. LITERATURE REVIEW

Rwanda's national program of using ICT in education

In the case of Rwanda, as part of the government's efforts to infuse ICT into its administration; it has also included e-education. E-education is an initiative within the broader frameworks of Rwanda's Vision 2020 in reaching its MDGs. It seeks to move away from traditional textbooks to an electronic format with broader access to information. It also has an objective to allow more input from ordinary citizens in the decision making process of its educational programming. The goal is to provide the population with expedited ICT knowledge. It requires at least one member in each household to acquire ICT skills, with which they will pass on to other family members. The country also had designs in which all Rwandans would be networked and equipped with standard ICT tools and trained facilitators by 2013 (Mineduc, 2008) . As it was also reported by the Government of Rwanda (2014), Rwanda's Vision 2020 aims to transform the country into a knowledge-based, technology-led, and middle-income society by the year 2020.

Information and Communication Technology (ICT) is considered as a ubiquitous tool that will energize the country's socio-economic development. To achieve this vision, the education sector strategized skills development through six main projects. Those include ICT Professional Certification Programs: Developing a competent and relevant ICT professional base; SchoolNet: Increasing the penetration and usage of ICT in 9 and 12-year basic education; ICT training for teachers: Developing teacher capabilities in and through ICT; Rwanda Education and Research Network (RwEdNet): Enhancing teaching, learning and research through ICT in Higher Education; Open, Distance and e-Learning (ODeL): Increasing access to education and Digital Library: Increasing access to scientific publications for educational institutions and the general public. The implementation of such projects requires a rigorous body of research and evidence to inform and guide the practice. Some studies conducted in a Rwandan context have already shown that the effective use of ICT in schools as a tool for enhancing learning depends to a great extent on change of attitude toward the accountability, ownership and commitment of different stakeholders in education (Mukama & Anderson, 2008). Additionally, the Rwandan government has identified the use of ICTs as the key tool in transforming the economy, with education playing an important role in achieving this goal. There have been a range of initiatives for providing basic ICT infrastructure and computers in schools. Whereas schools in urban areas may have internet connectivity, only a small number of schools in rural areas are connected to the internet (Karangwa et al, 2010).

Research specified that in 2008, with the introduction of ICT as a subject in the Rwandan school curriculum, schools have had to provide students with more access to computers. Each class at secondary school level was allocated two hours a week on the school timetable for ICT lessons and that has created a new tension between those teachers who use computers for teaching and learning ICT skills and those who want to use ICT for the teaching and learning of other subjects, such as mathematics and science. The latter group is increasingly finding it difficult to access the computers, since the use of ICT to teach other subjects is not yet seen as a priority, given the relatively scarce ICT resources in schools. The limited access to computers and other ICT resources in schools was impacting on how students were using ICT, with students not being able to exercise control over technology and content. The ICT curriculum could constrain ICT teachers to 'teach theory' before allowing students hands-on engagement with the technology.

To add on, many national curricula in Europe include ICTs and it is increasingly becoming an examined subject in Africa and Asia as national strategic development documents recognise the importance of ICTs in teacher capacity-building and professional development. But despite the increased emphasis on training teachers on the use of ICT, decisions to make such training compulsory are not always certain. In the case of Rwanda, such courses in teacher training programmes have not always been a

prerequisite for teaching where it was officially considered an optional subject within its national curriculum and Rwanda is currently in the process of reviewing its ICT in Education Policy and UNESCO is supporting the Rwanda Board of Education in updating its ICT Essentials for Teachers Curriculum, based on the UNESCO ICT Competency Framework for Teachers: now approved by the cabinet on 27/04/2016 (Jaco, 2015). For the higher institutions, Harerimana (2015) argued that teachers perceive ICT to be useful to them and are more eager to have positive thoughts on the use of ICT in the classroom. Additionally, they are, whenever possible; ready to learn from trainings, other ICT users, opinions of colleagues and students. From all these, it clear that ICT plays a key role in the development of the education of a country that finally leads to the one of the entire country because education drives country's development as well. This research then focuses on how those teachers (lecturers) and students use available resources to effectively integrate ICT it teacher education journey.

Importance and role of ICT in education

Technology can play various instructional roles and it is the responsibility of the instructors to decide how to best use technology to support student learning. Having a complete infrastructure of the ICT will go meaningless if it is not utilized to the fullest capacity (Dawam et al, 1999). In the current world, no one can ignore the contribution and the influence of technology not only in educational systems but also in other fields or domains of life. However, coming specifically to education, Hamidi et al. (2011) argued that today various informational and communicational technologies have the ability of facilitating the education and learning process. Also there is evidence stating that information technologies provide effective and inflexible methods for professionally developing teachers.

He also highlighted some other advantages of using technology and IT in education whereby students learn their lessons by using technical tools in less time. All these show the tremendous part played by ICT in education.

Coming to the undeveloped countries, ICT has a major role in providing new opportunities in education (ibid, 2011). It is therefore obvious that if ICT provides new opportunities in education and also facilitates education and learning process, it is then a key agent of change in the today's education system. In the same line of thought, Syed Noor argued that one of the most vital contributions of ICT in the field of education is- Easy Access to Learning. With the help of ICT, students can now browse through e-books, sample examination papers, previous year papers etc. and can also have an easy access to resource persons, mentors, experts, researchers, professionals, and peers-all over the world. This flexibility has heightened the availability of just-in-time learning and provided learning opportunities for many more learners who previously were constrained by other commitments (Young, 2002). Young also added that the use of ICT in educational settings, by itself acts as a catalyst for change in this domain. ICTs by their very nature are tools that encourage and support independent learning.

Students using ICTs for learning purposes become immersed in the process of learning and as more and more students use computers as information sources and cognitive tools (Reeves & Jonassen, 1996), the influence of the technology on supporting how students learn will continue to increase. Indeed, the uses of ICT are making major differences in the learning of students and Teaching approaches. Schools in the Western World invested a lot in ICT infrastructures over the last 20 years, and students use computers more often and for a much larger range of applications (Volman, 2005). Several studies reveal that students using ICT facilities mostly show higher learning gains than those who do not use. For instance, Kulik's (1994) finding across 75 studies in the United States showed the following. Students who used computer tutorials in mathematics, natural science, and social science score significantly higher on tests in these subjects. Students who used simulation software in science also scored higher. The findings also indicated that primary school students who used tutorial software in reading scored significantly higher on reading scores. Very young students who used computers to write their own stories scored significantly higher on measures of reading skill. Moreover, students who used word processors or otherwise used the computer for writing scored higher on measures of writing skill.

Furthermore, the use of ICTs in education shifts the learning approaches. Considering (Bransford, Brown & Cocking, 1999) cited in Volman (2005), there is a common belief that the use of ICTs in education contributes to a more constructivist learning and an increase in activity and greater responsibility of students. This limits the role of the teacher to supporting, advising, and coaching students rather than merely transmitting knowledge. The gradual progress in using computers changes from learning about computers, to learning computers, and finally to learning with computers (Volman, 2005). With respect to introducing ICT technologies in schools, Olson (2000) advises to explore the following questions as bases for in-service teacher education. These are (1) how can the theoretical ideas tested in practice? (2) What does practice say back to these theoretical ideas? (3) How is useful negative feedback obtained? (4) What might be substantive

talking points about the new processes? What is practical from a classroom perspective? (5) What does talking about the new say about the nature of existing technology? Is it adequate? (6) What scaffold needs for the next stage?

On the other hand, teachers' reluctance to adopt innovations need to be seen in the context of existing technology and commitments. Fullen (1989) cited in Watson (2001) states that change or improvement can happen at schools if teachers understand themselves and understood by others. For instance, many teachers are currently not in a position to make informed judgments on ICTs to support their teaching goals. Clearly a variety of factors still do make using ICT in the curriculum problematic (Watson, 2001). Because of this, the influence of ICT did not bring revolutionary changes at schools. For instance, the National ICT survey in the Netherlands shows that most primary-school students use computers less than once a week and there are still many secondary school teachers who do not use ICT at all (Volman, 2005). Most often, they use computers for drill-and-practice and word processing.

Before closing this point, there was also another important view to highlight and that is from Bingimlas (2009) where he argued that ICT can play various roles in learning and teaching processes. In the same study, Bransford et al. 2000 and Wong et al. 2006 respectively reported that ICT has great potential to enhance student achievement & teacher learning and can also play a part in supporting face-to-face teaching and learning in the classroom. Another benefit from using ICT, especially in science education, is that it expands the pedagogical resources available to science teachers (Al-Alwani, 2005). And this also was supported by Pickersgill (2003) when he was exploring the effective ways of utilizing the internet in teaching science. The study found that the ease use of internet allows teachers to help students to become experts in searching for information rather than receiving facts. And, as the same study showed, that would increase the students' awareness of the importance of the world around them, of citizenship and of scientifically literate community.

Teachers' responsibility

It will be of no sense to talk about integration of ICT without looking at educators' competence. ICT competence is one of important prerequisites for effective ICT integration in teaching-learning transaction. Gagne et al. (2005) hold that: "people need to be technologically literate in order to use electronic resources such as internet, search engines, internet development tools". Even when Higher Education Institutions are well furnished with ICT resources, it will be of no benefit if educators do not have sufficient knowledge on how to integrate the resources. It should also be clear that, it is not enough for educators to have ICT skills and be able to use them in teaching their students. Instead, they need to be able to help the students become collaborative, problem-solving and creative learners through ICT integration so that they will be prepared to be effective citizens and members of the society (Makewa et al, 2014). This shows a vital contribution of the educators in the implementation of ICT. One may claim to be implanting ICT in any educational program; but if teachers are not competent enough in the matter and as we know that they are key drivers of education; the whole system seems to fail gradually. It is obvious that teachers can't guide students in the using of ICT if themselves are not equipped enough of it. Therefore, it is mandatory that teachers get skilled first so that they can take the lead in the facilitation and the guidance of their students towards the ICT usage and integration in other programs of study.

This will allow teachers to have sufficient subject knowledge, a repertoire of teaching methodologies and strategies, professional development for lifelong learning. These programs will expose them to new modern channels of information, and will develop self-guided learning materials, placing mob re focus on learning rather than teaching. However, it is important to point out that ICT is used to enhance teaching styles, and should not replace the role of the teacher. ICT helps create structured and systematic teaching as well as better school management and organization of ICT usage. Teachers should be provided with adequate and appropriate support in their classrooms, and be guided by professional standards that incorporate a code of conduct (Semenov, 2005).

Challenges of ICT implementation and integration

Before looking at the challenges that impede the implementation and integration of ICT, it is worthwhile considering conducted by the International Institute for Communication and Development (IICD). The study indicated that 80% of its participants felt more aware and empowered by their exposure to ICT in education, and 60% stated that the process of teaching as well as learning were directly and positively affected by the use of ICT. ICT can play a vital role in increasing access to education as well as providing better quality education (pg7). They added that the use of various multimedia devices such as television, videos and computer software can offer a more challenging and engaging learning environment for students of all ages (Gutterman et al., 2009). However, there are more researches that have been done on the challenges of the ICT integration. Starting on the one conducted in Tanzania; despite of the achievements

revealed by some of the Tanzanian universities in implementing ICT for teaching and learning processes, these universities still face a lot of challenges in undertaking such a process. Among those challenges mentioned was the Lack of systemic approach to ICT implementation; Even though like other education system, the integration of ICTs needs a clear planning and organization; this is not the case in many higher learning institutions in developing countries as most of them have embraced the ICT integration process without clear plans to guide the way (Sife et al., 2007). There are a number of issues that were identified here to be taken into considerations when planning to integrate ICT but which are not catered for in Tanzania. These issues include, among others: (i) ICT infrastructure already in place; (ii) ICT skill levels in the institution; (iii) Number of staff and students in each department and projected growth; (iv) Academic management process: curriculum development, assessment methods and administration; (v) Cost-effectiveness analysis (including hidden costs) and the choice of proper technologies for the needs of the institution; and (vi) Staff development in new technologies.

In addition to that, the awareness and attitude towards ICTs was mentioned. On this issue the point is that all the stakeholders need to know the existing facilities and services and their importance in relation to their specific tasks. As quoted in Woodrow (1992); "positive attitude 15 towards ICTs is widely recognized as a necessary condition for their effective implementation". It was therefore shown that the active involvement of the all the stakeholders is very important to solve the problem of limited awareness and attitudes. Another point was the administrative support. In highlighting the contribution of the administration in the ICT integration in education, the author quoted Dwyer *et al* (1997) who emphasized that for the integration of ICTs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, pedagogical, administrative, financial, and social dimensions of ICTs in education. He added that administrators can provide the conditions that are needed, such as ICT policy, incentives and resources. The commitment and interest of the top management and other leaders at every level is the most critical factor for successful implementation of ICTs.

Other issues that impede ICT usage include national policies and plans. Example drawn from African countries, many of the countries do not have national ICT policies and this leads to situation where each university has to do what it knows best to do without a central coordinating document. The presence of an ICT policy in a country cannot be overemphasized as it goes a long way to streamline ICT implementation across institutions–private or public. The problem of ICT policy brings to the fore the issue of restrictive regulatory framework as Luboobi (2007) observed that the regulatory frameworks for the telecommunications, ICT and intellectual property rights are still restrictive in most African countries. All these show how the administration of the educational institution and government policies support much in the implementation of various programs especially ICT integration. Still on the challenges, technical support was in. On this point, the research showed the technical support as an important part of the implementation and integration of ICT in education system. And this support includes issues like installation, operation, maintenance, network administration and security. That support is obviously not available, which implies that trainers and students require some basic skills to overcome technical problems when using ICTs. In most schools these support staff are not available and even if there are there; some are not trained enough or they just work today and tomorrow then turn over because they are not maintained or motivated to stay at work.

In Malaysia Dawam et al. (2009) reported, from a survey done, that the level of ICT resources was still inadequate for academic use for educators. The survey showed that the educators' access to those resources was insufficient for their educational purposes. This was due to the facts that, majority of the institutions did not have enough ICT resources. However, as quoted in Unwin (2007) "it is not the availability of the technology which is important, but how it is used" that matters. In order to encourage them integrate the technology into the curriculum, enough resources should be made available to them besides providing courses and workshops to assist them master the related software according to their discipline.

There are more other significant challenges in integrating ICTs use in education rising from environmental, cultural and educational faced by policy makers, educators, educational administrators and students in higher education. These ones were highlighted by Mbodila et al. (2013) where they reported things to be considered when integrating ICT in education in environmental challenges. These include among others, the appropriate rooms or buildings available to house the technology and the availability of electricity and telephony in most developing countries where there still large areas without a reliable supply of electricity and the nearest telephones are miles away. For Cultural challenges, they gave an example of English which is the dominant language of the internet (80% of online content) and in most countries where English is not the first language this represents a serious

barrier in integrating ICTs use in education system. A typical example given here was the situation in South Africa where student's multilingualism background causes a major challenge in the role of ICTs in South African higher education system. When we can refer that to our Rwandan situation which is a monolingual society, though it's good that culturally many Rwandan students only master their mother tongue which is Kinyarwanda but that is a key challenge to them as they need to use English to access to the information from the internet for instance.

Ending with the educational challenges, they argue that ICTs in education require large capital investments and due to financial difficulties, government in some part of the world specifically developing countries priority is the rehabilitation of school buildings and teacher welfare while ICT for education on the other hand has not yet been considered a priority. In some part of the world due to educational background generally there is lack preparedness for students entering higher education in the knowledge and skills required for the basic use of technologies. However, for this preparedness, it might not be the case for the Rwandan students because the government of Rwanda has tried to put in place various programs like the One Laptop Per Child project in order to help young children to get ICT skills when they are still young and utilize them at a later time either in their further studies or in their daily life activities. In Nigeria a quite similar study has been done and found ICT has a key role to play in enabling the education industry to manage complex information flows and to integrate them towards effective educational planning and development but although ICT holds great potentials in supporting and augmenting existing educational as well as national development efforts in Nigeria, several challenges remain. These challenges include: resistance to change from traditional pedagogical methods to more innovative, technology-based teaching and learning methods by both students and academics; Inadequate ICT infrastructure including Computer hardware and software and bandwidth/access; Lack of qualified ICT personnel and lack of the necessary infrastructural facilities to benefit from ICT (Adeyemi, 2013).

It was reported hereby that most institutions in Nigeria lack computer literate teachers and ICT experts that would support and manage the Internet connectivity and/or application of computing in the teaching-learning process.

In the survey conducted, the ideal staff-computer ratio should be 1: 1 which will enable staff to use ICT as a tool for delivery of education. Sadly, no university in Nigeria, as at that day, had this ideal ratio. The overall educational system was under -funded (Taiwo, 2004). Therefore available funds were used to solve more urgent and important survival needs by the institutions while the development and subsequent operation of ICT require huge financial investment in, and commitment to, the acquisition of necessary facilities and their maintenance. That maintenance was also emphasized by Reid, 2002 among the concerns or bottlenecks that teachers have about the use of Technology in classrooms. He argued that though teachers thought it was beneficial to the educational process and should be continued; several concerns emerged from them. Among those challenges, there was maintenance of the tools; inequalities or disparities between students who have access to computers at home and those who do not; need for training of teachers; Information Overload and teachers' Time where students are claimed to be overwhelmed with the amount of information available and teachers requiring an extra time was needed to learn new software and also to create new things for teaching because greater expectations were being placed on them; then Plagiarism where the report was that technology was making it easy to reproduce and revise someone else's work by cutting and pasting things.

III. THEORETICAL FRAMEWORK

This study hinged on the theory of Constructivism. According to Brophy (1994), constructivism is a theory whereby learners construct their own learning, new learning is built on prior knowledge, learning is enhanced by social interaction and meaningful learning develops through authentic tasks (Suzan & Elizabeth, 2004). Constructivism is a paradigm of learning that assumes learning as a process where individuals ''construct'' meaning or new knowledge based on their prior knowledge and experience (Johassen, 1991). Educators also call it the emerging pedagogy in contrast to the long existing behaviorism view of learning. Through this theory, students are no passive recipients of their own learning and do not come to learn as empty vessels to be filled in. It is in this regard that, in the ICT integration, students need their autonomy to utilize their inputs and pre - requisite knowledge and also interact with their peers and teachers as well in order to construct their learning to best.

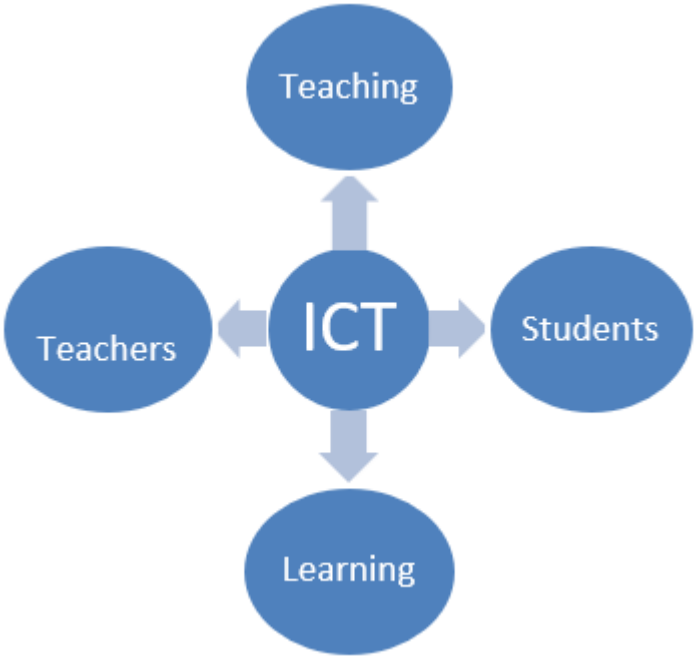
The general sense of constructivism is that it is a theory of learning or meaning making, that individuals create their own new understandings on the basis of the interaction between what they already know and believe and knowledge with which they come into contact. For many teachers, the focus on constructing meaning in the teaching-learning process resonates with prior beliefs because constructivist - based instruction firmly places educational priorities on students' learning. As Davis,

Maher & Noddings (1990) said, "It is assumed that learners have to construct their own knowledge--individually and collectively. Each learner has a tool kit of concepts and skills with which he or she must construct knowledge to solve problems presented by the environment. The role of the community-- other learners and teacher-- is to provide the setting, pose the challenges, and offer the support that will encourage mathematical construction."

Though there are other scholars who worked on constructivism like Lev Vygotsky but the formalization of the theory of constructivism is generally attributed to Jean Piaget, who articulated mechanisms by which knowledge is internalized by learners. He suggested that through processes of accommodation and assimilation, individuals construct new knowledge from their experiences. When individuals assimilate, they incorporate the new experience into an already existing framework without changing that framework. This may occur when individuals' experiences are aligned with their internal representations of the world, but may also occur as a failure to change a faulty understanding; for example, they may not notice events, may misunderstand input from others, or may decide that an event is a coincidence and is therefore unimportant as information about the world. In contrast, when individuals' experiences contradict their internal representations, they may change their perceptions of the experiences to fit their internal representations. According to the theory, accommodation is the process of reframing one's mental representation of the external world to fit new experiences. Accommodation can be understood as the mechanism by which failure leads to learning: when we act on the expectation that the world operates in one way and it violates our expectations, we often fail, but by accommodating this new experience and reframing our model of the way the world works, we learn from the experience of failure, or others' failure. It is important to note that constructivism is not a particular pedagogy. In fact, constructivism is a theory describing how learning happens, regardless of whether learners are using their experiences to understand a lecture or following the instructions for building a model airplane. In both cases, the theory of constructivism suggests that learners construct knowledge out of their experiences (Tobias & Duffy 2009). From these basic denotations about constructivism, this research opt that theory to guide the research.

Thus, through a successful use of ICTs, students would be able to interact with their teachers, their peers and the world in general in order to construct their knowledge from the existing beliefs and skills they already had before.

In line with the above theory, the researcher hinged this study on the concept that follows:



Source: *Researchers' conception of ICT in teaching and learning*

Based on this chart, teachers and students will be using ICT in their teaching and learning activities respectively. Their success in teaching and learning would depend on how they used or integrated the ICT in their daily educational activities. The framework holds it that if all the parties concerned feel more responsible and play their respective roles and also get the required support, ICT will be successfully integrated at all the levels of educational curriculum. This would also help to use and maintain sustainable management and usage of the ICT in various activities conducted by those people involved.

IV. METHODOLOGY

This study is a descriptive research intended to describe the portrait on the integration of ICT educational curriculum in the University of Rwandan-College of Education. The researchers used both qualitative data and some quantitative data for the descriptions of practices and processes that are applied by the informants in the ICT integration practices. The researchers consulted the informants of different categories of people who are interested in ICT integration in educational curriculum. The target population of this study was composed of all the college teaching staff and third level students who, in one way or the other, use ICT in their teaching and learning in the current world driven by technology. The number of the

whole population was 126 lecturers and 1858 students which make a total of 1984 people. Purposive sampling was used to get respondents from level three students whom the researchers thought they were experienced enough to provide educational information regarding ICT integration. For the individual respondents, non-probability sampling was used as the researchers contacted available 26 lecturers at that time. The investigators used questionnaire, observation and questionnaire, observation and focused discussions were used as research instruments. The researcher handed questionnaires to students randomly while they were in their classes, just simply giving to one after the other when they are in a mixed class (various combinations together) for them to answer. Questionnaire was used to collect information from lecturers and students. On the other hand, some other lecturers provided information through an interactive discussion with the researcher. The questionnaire used was made up of open and close ended questions matching the aim of the study. As for the discussion, it was used to collect data 27 from different people face to face through unstructured talk. These discussions were flexible and allowed the researcher to probe for more and clearer information.

Data collection procedure

The researchers collected data from both primary and secondary sources. "Primary data refer to the information a researcher obtains from the field while secondary data are the ones that supplement primary data basing on previous researches found in literature written in different books, articles, reports and causal interviews" (Jack &Norman, 2003). Questionnaire was developed, tested for a small group of people and afterwards distributed to the target group who filled them (in their respective classes or offices for lecturers) to take them back for coding, analyzing, interpreting for further uses. As for discussions, the researchers went and met respondents and exchanged views with them face to face.

Validity and reliability

Ahuja (2003) defines reliability as the degree to which measures are free from error so that they give same results when repeated measurements are made under constant conditions". To ensure that validity of research instruments is treasured, there was a thorough consultation of relevant documents and educational professionals who helped to make necessary amendment of tools in order to improve their clarity and richness in order to attain the set objectives of the study. For the reliability, the instrument was pre - tested to at least 10 respondents in order to determine the accuracy of the measuring instrument and amend it later accordingly.

Ethical issues

Since University of Rwanda is a public institution and it governed by laws, the researchers sought an official permission to carry out research and also made sure that the data provided be kept confidential and remain for the research interest not for any other purpose; be it political, academic or personal concern. Moreover, before contacting any respondent in every meeting of collecting data, a verbal consent from respondents had to be reached and also being at the same time an employee and a student of the University of Rwanda, that could not allow the researcher to ask what is alongside principles.

V. ANALYSIS AND INTERPRETATION OF FINDINGS

The purpose of this study was to investigate how ICT is integrated into educational curriculum especially in teaching and learning practices at the College of Education, University of Rwanda. In this section, the researchers present and analyze information from respondents. Data were collected using a questionnaire and through interviews. Then, the data were captured and analyzed using the Statistical Package for Social Sciences (SPSS version 16). Analysis includes descriptive statistics such as frequencies, means and percentages and tables. Data collected through open-ended questions were scrutinized and interpreted accordingly.

Population description

The following table shows the population characteristics for the side of students.

Gender	**N**	**Percent**
Male	59	65.6
Female	31	34.4
Total	**90**	**100.0**

Program of study

Gender	**N**	**Percent**
Male	59	65.6
Female	31	34.4
Full time	90	100.0
Age		
Under 30	90	100.0

Source: Primary data

When it comes to lecturers, the table3 below shows their demographic information.

Participants' demographic information

Gender	**N**	**Percent**
Male	37	74
Female	13	26
Total	**50**	**100**
Years of teaching experience		
0-5	9	18
6-10	35	70
11-15	1	2
Above 15 years	5	10
Age		
31-40	33	56
41-50	12	24
Above 50	5	10
Highest degree		
PhD	11	22.0
Masters	38	76.0
Bachelors	1	2.0

Source: Primary data

N= The total population of respondents (50) **n=** The number individual respondents

Views of students on ICT opportunities

Questionnaire items	**A&F**	**ST**	**R&N**	**M(STDEV)**
Tools /Opportunities	**n(%)**	**n(%)**	**n(%)**	
The use of personal computer in ICT integration in education especially in learning	10(11.1)	27(30.0)	53(59.9)	3.7(1.2)
The use of mobile phones in ICT integration in education especially in learning	76(84.4)	8(8.9)	6(6.6)	1.6(1.0)
The use of Projection system in ICT integration in education	39(43.3)	34(37.8)	17(18.9)	2.6(1.0)
The use of Audio equipment in ICT integration in	20(22.2)	18(20.0)	52(57.8)	3.5(1.3)

education				
The use of interactive whiteboard in education especially in learning	64(71.1)	13(14.4)	12(13.3)	1.9(1.2)
The use of Video conferencing system in ICT integration in education	5(5.5)	19(21.1)	64(71.1)	4.1(1.0)
The use of Internet sharing in ICT integration in education	45(50)	34(37.8)	11(12.3)	2.4(1.1)
The use of Digital photo cameras (including editing software) in ICT integration in education	10(11.1)	15(16.7)	64(71.1)	4.4(4.4)
The use of Digital video cameras (including editing software) in ICT integration in education	10(11.1)	13(14.4)	66(73.4)	4.0(1.0)

Source: Primary data

A&F= Always & Frequently **ST=** Sometimes

R&N= Rarely& Never **M(STDEV)=** Mean(Standard Deviation)

From the table above, students demonstrated that they use mobile phones at high level (84.4%) as an ICT when they are learning. These results surprisingly showed that 71.1% use interactive whiteboard but in the real sense of things; it seems that they did not at first understand what a interactive whiteboard is because when we discussed with some of them, they affirmed to have never seen any. Therefore, this percentage gives the impression that really is not matching with what students know or actually do in class. For personal computers, data in table4 indicate that the majority 53(59.9%) of the students reported rare or no use of personal computers for learning while only 10 (11.1%) of the 90 respondents declared using the computer always and frequently. The implication here is that the mobile phone as the easiest portable tool to use by many people, though they seem to be used for calling and sending messages, but they can on the other hand become useful in teaching-learning process then serve learning tools.

Internet was also another opportunity that students do profit and use it for their learning activities because a good number of 50% of the respondents showed that they share learning information through internet. For video opportunities like video conferencing or even simple digital video cameras, in addition to digital photo cameras; they were clearly shown to have a very limited use in the students learning activities because their usage vary between 5 to 11% of the respondents who claim to use them. This shows a rare or no total use of these ICT tools for the students' learning. On the point of how lecturers view ICT opportunities at the college, various views from those lecturers were summarized in the table5 and it indicates an obvious use of personal computers where 100% of the lecturers who responded use personal computers as an important tool in their everyday activities though not necessarily in teaching-learning. This information agrees with Harerimana (2014)'s study where he indicated that the College of education provides desktop to every teacher. Nevertheless, the lecturers reported that they prefer using their own laptops because they are comfortable to transport and use everywhere and desktop computers are mostly used by those who cannot afford laptops.

As it happened for students, the use of interactive whiteboard was also mistakenly reported as being used at 62% while, as reported earlier, there no single board of that kind in the whole campus. In this section internet sharing was also highlighted to be always and/or frequently used by lecturers in their interactions with their students through various modules they teach them. Even if lecturers use computers for personal and research purposes or for convenience in communication (email) and access to research materials globally, they may be unwilling to hug ICT in teaching and learning process because of low level of preparedness and lack of reward to some of their initiatives. As it was also put forward by Larose et al (1999), integrating ICT into teaching is relatively new in Africa and although this field of research is relatively young in that it deals with the implication of implementation of computer technologies in different working or educational environments, it reflects well established traditions in the psychology of work. Such tradition may have to do with unwillingness to accept anything new or lack of incentives for innovation in the first instance and reduction in teacher - students' interaction. However, there was indication of willingness to accept training to meet requirements for use of ICT tools in teaching and learning provided that enabling environmental conditions are made available.

Video-related resources were again reported to be rarely used or not used by lecturers. For the case in point, as indicated in the above table, the video conferencing system was reported for rare or no use at by (98%) of the respondents while the television and digital video cameras were reported at 94% of the rare or no use respectively. The digital photo (90%) and the radio (86%) were also the ICT opportunities which are not genuinely utilized as these percentages presented were attributed to the rare or no use of those resources.

Views of lecturers on the ICT opportunities

Questionnaire items	**A&F**	**ST**	**R&N**	**M(STDEV)**
Tools /Opportunities	**n(%)**	**n(%)**	**n(%)**	
The use of personal computer in ICT integration in teaching	50(100.0)	0(0.0)	0(0.0)	1.2(0.4)
The use of interactive whiteboard in education especially in learning	31(62.0)	4(8.0)	15(30.1)	2.6(1.6)
The use of mobile phones in ICT integration in teaching	17(34.0)	15(30.0)	18(36.0)	3.1(1.2)
The use of Projection system in ICT integration in education	37(74.0)	11(22.0)	2(4.0)	2.0(0.8)
The use of Audio equipment in ICT integration in education	13(26.0)	12(24.0)	24(48.0)	3.4(1.2)
The use of Video conferencing system in ICT integration in education	1(2.0)	0(0.0)	49(98.0)	4.7(0.6)
The use of Internet sharing in ICT integration in education	34(68.0)	13(26.0)	3(6.0)	1.9(0.9)
The use of Digital photo cameras (including editing software) in ICT integration in education	1(2.0)	4(8.0)	45(90.0)	4.4(0.8)
The use of Digital video cameras (including editing software) in ICT integration in education	1(2.0)	2(4.0)	47(94.0)	4.6(0.6)
The use learning management systems like moodle and others in ICT integration in education	1(2.0)	3(6.0)	46(92.0)	4.6(0.6)
The use of television in ICT integration in education	2(4.0)	1(2.0)	47(94.0)	4.6(0.8)
The use radio in ICT integration in education	3(6.0)	4(8.0)	43(86.0)	4.4(0.9)

Source: Primary data

In a focused-group discussion with some lecturers, they pointed out some other ICT learning systems that they were trained for and which can be very helpful for their students. Those include among others: Moodle, MendeLey, Quadrics, Cahoot, Speakify, Diasporalink, and more others. However, they also added that, though there are some trained lecturers on the use of those resources they don't use them because of limited infrastructure and big number of classes that become an impediment to the efficient use of the cited systems. As an example one articulated:

> We got trainings for the use of those various systems from Sweden and there are more lecturers trained but the conditions under which we work where classes are too populated and even many related infrastructures are not available at the college; so all these bring those trained people to keep those skills unused while they could be helping our students and teachers to easily and proficiently do their work through an advanced technology.

Views of students on challenges in integrating ICT

Questionnaire items	**A&F**	**ST**	**R&N**	**M(STDEV)**
Challenges	**n(%)**	**n(%)**	**n(%)**	
Insufficient number of computers as a challenge met when integrating ICT in education	65(72.3)	20(22.2)	5(5.5)	1.7(1.0)
Weak infrastructure as a challenge met when integrating ICT in education	50(55.5)	26(28.9)	10(11.1)	2.2(1.1)
The problem of big number or large classes as a challenge met when integrating ICT in education	62(68.9)	8(8.9)	20(22.3)	2.1(1.5)
Slow network as a challenge met when integrating ICT in education	48(53.4)	24(26.7)	18(20)	2.4(1.3)
The big workload or information overload as a challenge met when integrating ICT in education	48(53.4)	22(24.4)	20(22.3)	2.5(1.2)

Source: Primary data

From that table, the most prominent challenges were raised among others and we can understandably see that the insufficient number of computers was the key challenge raised at a rate of 72.3%. But in a live talk to students, they claim to have few computers in the lab and even when they get there; they find some of the computers are locked by their counterparts.

For instance, one respondent said:

> We seem to have common computers that we do share as students but some of us feel that they own those computers than we all do to the level that they put passwords into them and when we go there to use them we find that we are blocked somehow.

When the researchers visited the lab while students were using those common machines from the computer lab; the researcher found that some computers were not useful as students claimed and they were also locked with passwords; something which reduces the number of computers to be used by the users in need even if they seem to be available in the lab. That agrees in some points with the results from respondents in the worldwide research done on the "obstacles to the integration of ICT in education where Pelgrum (2001) found a list of obstacles including the insufficiency of computers at a rate of 70%. This is to mean that computers are the key resources in the ICT integration in education systems.

Another related challenge to that is the big number of students in class. Though students did not mention the exact number of students but they confirmed at 68.9% that the large or big class size challenges their use of ICT in learning. To those we discussed live, they said that a class of about 200 to 300 people is really a big class for them to be comfortable in any learning situation. One of them argued:

> We are obviously many students in class and even if our lecturers try divide us in some groups to facilitate the learning but still it is a challenge for us when we want to use computers in the lab because some classes have big numbers which the lab cannot accommodate.

The slow network and the information overload were also reported at 53.4% respectively. For the information overload, students also reported (through the discussion) that they have a lot of things to do in quite short of time. One claimed:

> We are supposed to have our so-called self-study time but that time is never there as we are always in class. So we pass sleepless nights reading our notes to pass the CATs and exams; therefore we only go to ICT for relaxing in any free time we get.

For the views of lecturers on the challenges faced in the ICT integration, results show different extremes to some of the challenges and very low rates on others. Table 7 below demonstrates corresponding percentages for the revealed challenges.

Views of lecturers on the challenges in integrating ICT

Questionnaire items	**A&F**	**ST**	**R&N**	**M(STDEV)**
Challenges	**n(%)**	**n(%)**	**n(%)**	
Insufficient number of computers as a challenge met when integrating ICT in education	35(70)	9(18)	6(12)	2.0(1.2)
Lack of time to incorporate ICT into teaching	12(24)	26(52)	12(24)	3.1(0.9)
Lack of relevant knowledge and skills to integrate ICT	27(54)	7(14)	16(32)	2.6(1.3)
Non availability of technical assistance	19(38)	26(52)	5(10)	2.5(0.8)
Weak infrastructure as a challenge met when integrating ICT in education	38(76)	9(18)	3(6)	2.1(0.9)
Outdated software	19(38)	24(48)	7(14)	2.8(0.8)
Low quality of ICT trainings	30(60)	15(30)	5(10)	2.3(1.0)
The problem of big number or large classes as a challenge met when integrating ICT in education	44(88)	5(10)	1(2)	1.6(0.7)
Lack of administrative support	28(56)	19(38)	3(6)	2.4(0.9)
Lack of ICT trainings	20(40)	15(30)	15(30)	2.8(1.4)
Slow network as a challenge met when integrating ICT in education	28(56)	16(32)	6(12)	2.5(1.0)
The big workload or information overload as a challenge met when integrating ICT in education	33(66)	10(20)	7(14)	2.2(1.2)
Students have no access to ICTs as a challenge when integrating ICT in education	31(62)	9(18)	10(20)	2.3(1.1)

Source: Primary data

From that table, the only prevailing challenge to which lecturers have shared agreement is the problem of large classes or many students in one class. This is displayed by the 88% of the respondents who reported to have agreed and/or strongly agreed with this challenge to be a prominent hindrance to the ICT integration in education. The weak infrastructure and insufficient number of computers (compared to the number of students who are supposed to use them) were also reported to hamper the effective integration of ICT in education at a charge of 76 % and 70% respectively. Lecturers did not disregard their huge workload as another challenge that holds back the ICT integration in their daily educational practices. This is noticeable in the 66% of the respondents who affirmed that they always and/or frequently meet this constraint.

Slow network and lack of administrative support were rated at 56% respectively among the key challenges to cater for in the ICT integration in education; and this percentage can't be ignored when discussing about challenges. It is obvious that when one can also consider those who declared that they sometimes meet those challenges; the percentage can raise to 80% for every one of them; which implies that they are considerable challenges to be taken in hand in order be remediated to help students and lecturers use ICT effectively in their educational activities.

Despite the fact that 32% of the respondents declared rare or not at all meeting the challenge of lacking relevant skills in integrating ICT in education but 54% manifested the constantly or frequently incidence of that challenge while 14% of them reported that it challenges them occasionally. These statistics are a sign of a fact that some lecturers are really in need of training for them to fruitfully integrate ICT in their daily professional practices. This is in the same line of thought by the view of Gagne (2005) who argued that people need to be technologically literate in order to use electronic resources such as internet, search engines, internet development tools. He also added that even when Higher Education Institutions are well furnished with ICT resources; it will be of no benefit if educators do not have sufficient knowledge on how to integrate the resources. This also moves together with Sinko & Lehtienen who said that 'Network technology creates enormous possibilities but demands high levels of

skill from its users but in actual fact, the issue is not just technical mastery of network use, but above all the cognitive skills of presenting and developing meaningful questions, and interpreting information by integrating it with previously accumulated knowledge and giving it an appropriate context.' (Sinko & Lehtinen, 1999)

For more challenges of the ICT integration, when asked why they fail to use some ICT opportunities available, lecturers reported the following; among others: Lack proper trainings to use those ICT resources; non-availability of some relevant ICT tools. For example, one said:

> We don't use some materials like TV, Video or Audio equipments because they are not available in our classrooms and even sometimes projection becomes impossible because projectors are few in numbers so it not possible to find those materials in all classrooms.

The lack or insufficient supporting staff and the big were also other stressed key challenges to this integration. As one highlighted,

> We do not use some of the ICT resources as the college doesn't provide these resources even though they are planned in modules descriptions may be because these resources are costly or not available. It may also be caused by the lack of supporting staff in such matter.

From the report of lecturers who gave ideas that ICT integration is a issue of computer science teachers; the researchers went and talked to the department that is in charge ICT and they agreed that some lecturers are trained in the use of some resources like use of MOODLE, ODEL, ...but the environment becomes unconducive for them to practice or even some skills they were trained for will be useful at later time. They confirmed that ICT integration in education is a matter that requires everyone to be involved, not only teachers of computer science and some lecturers even use them without knowing like when they use microphones, loud speakers, projectors and more others.

Resistance to change is another challenge that was revealed because, in the discussion with some lecturers, some demonstrated a belief that using ICT in teaching would waste their time and when technology is fruitfully used, it would replace the teacher's place; while it's far from the reality. They also fear to lose students' attendance and become unsure that they have learnt the material or go against the academic regulation regarding attendance where students failing to attend at 85% are not allowed to sit for the final examination (UR academic regulation art.92). This is of the same opinion with Adeyemi (2013) findings on the of ICT implementation in Nigeria where he highlighted challenges like resistance to change from traditional pedagogical methods to more innovative, technology-based teaching and learning methods by both students and academics; Inadequate ICT infrastructure including Computer hardware and software and bandwidth/access; Lack of qualified ICT personnel and lack of the necessary infrastructural facilities to benefit from ICT.

The value of the relevant ICT policy in the ICT integration in education systems is a key factor that was also stressed by Ulka & Millind (2012) where they argued that though higher education institutes in developed countries have policies on the generative role, there are controversies about balancing long-term academic research with short - term technology transfer projects. Institutional and sector - wide higher education ICT policy and planning should identify the specific role of ICT in enhancing research capabilities and provide for adequate infrastructure backed by capacity building. Teacher has to adapt continuous professional development in the educational uses of technology. In this sense, teachers have to be ready to make use of the possibilities that ICT offer, such as different learning contexts, focused on the students, presenting them with several types of interaction, offering different degrees of control of their own learning, adapting to their personal interests, promoting collaborative tasks and developing autonomy in their work and study.

Views of students on solutions for ICT challenges

Questionnaire items	**SAg&Ag**	**NeuT**	**Dis&Sdis**	**M(STDEV)**
Proposed solutions	**n(%)**	**n(%)**	**n(%)**	
Supply computers to students as a solution for the improvement of ICT integration in education	84(93.3)	2(2.2)	4(4.4)	1.3(0.7)
Schedule time for ICT for all the students as a solution for the improvement of ICT integration in education	80(88.9)	4(4.4)	5(5.5)	1.5(0.9)
Establish a strong supervision on ICT integration as a solution	80(88.9)	3(3.3)	7(7.7)	1.6(1.0)

for the improvement of ICT integration in education				
Regularly train lecturers in ICT as a solution for the improvement of ICT integration in education	80(88.9)	4(4.4)	5(5.5)	1.5(0.9)
Provide relevant software as a solution for the improvement of ICT integration in education	82(91.1)	6(6.7)	1(1.1)	1.4(0.7)
Reduce the number of students in class as a solution for the improvement of ICT integration in education	73(81.2)	8(8.9)	8(8.9)	1.7(1.1)
Increase the ICT infrastructure as a solution for the improvement of ICT integration in education	85(94.4)	1(1.1)	4(4.4)	1.3(0.8)
Provide update software as a solution for the improvement of ICT integration in education	81(90)	3(3.3)	4(4.4)	1.4(0.8)
Design a policy governing ICT integration in education as a solution for the improvement of ICT integration in education	79(87.8)	5(5.6)	3(3.3)	1.5(0.8)
Provide technical support as a solution for the improvement of ICT integration in education	82(91.1)	4(4.4)	2(2.2)	1.3(0.7)
Reduce the lecturer's workload as a solution for the improvement of ICT integration in education	64(71.1)	13(14.1)	11(12.2)	2.1(1.1)
Increase connectivity as a solution for the improvement of ICT integration in education	83(92.2)	1(1.1)	6(6.7)	1.3(0.8)

Source: Primary data

SAg&Ag=Strongly Agree& Agree **NeuT=** Neutral

Dis&Sdis= Disagree& Strongly Disagree **M(STDEV)=** Mean(Standard Deviation)

From this table, the increment of the ICT infrastructure and the supply of computers to students were the most supported solutions to be useful for solving ICT challenges as it is shown by the respondents where they agreed on the two at 94.4% and 93.3% respectively.

Students revealed that giving computers to level-one students did not permanently solve the problem of ICT at all though it reduces the burden. One said:

> It's good that they gave computers to level one but what about others? We also need them more than even those level one because for us we shall start writing our action research next year. So we need computers and they can help us much.

To a percentage of 88.8% students supported the establishment of a strong supervision, scheduling the time table for ICT for all the students and regular training for lecturers. On these points, some students said that supervision is really required because there are some students who go to computer labs just for films and music and those occupy the computers which would be useful by others. They also added that the skills they got in level one when they study computer skills are not enough for them for the four years of study. For the trainings of lecturers some students argued*:* "some lecturers don't even know how to fix a projector. They really need training".

The increase of connectivity and the provision of technical support were also highly mentioned (92.2% and 91.1% respectively). At these points the students contacted claimed that sometimes there is not network it gets cut many times others said that the Wi-Fi is not even reaching everywhere in the campus. As for the technical support, one said: "when you meet a problem sometimes you even don't see anybody to help you. Our teachers of computer skills only help us when we are in class". This is what Semenov (2005) confirmed when he argued that teachers should be provided with adequate and appropriate support in their classrooms, and be guided by professional standards that incorporate a code of conduct Students' responsibility in the ICT integration. For the available tools, students reported that they try devoting sufficient time to the use of ICT tools and also keeping these tools safe and maintaining them properly so that they get used today and tomorrow. To illustrate this, one of the respondents articulated:

> Dare using ICT tools without fear, make the use of ICT a habit and become ICT-

> friendly to avoid technophobia. This has need of putting much effort and stay active by a belief that one can learn from everywhere he is not only relying on the classroom lecturing alone. It also brings us to search on the internet other lecturers teaching a similar topic and learn more from what we were taught in class.

Last of all, buying their own ICT tools (Bring Your Own Device) and use their personal mobile phones regularly to check on the internet was as well suggested as something that would also facilitate students using available resources as they are and not just wait and get limited to those they don't have. An impressive hope that would also lend them a hand of finding, from internet, answers for various assignments that they always do in class.

Coming to the views of lecturers on possible solutions that can serve to the identified challenges and bring ICT integration to the success; table 9 below shows a summary of their responses on how strong they agree or disagree with those proposed solutions.

Lecturers views on solutions for ICT challenges

Questionnaire items	**SAg&Ag**	**NeuT**	**Dis&Sdis**	**M(STDEV)**
Proposed solutions	**n(%)**	**n(%)**	**n(%)**	
Supply computers to students as a solution for the improvement of ICT integration in education	50(100)	0(0)	0(0)	1.3(0.4)
Schedule time for ICT for all the students as a solution for the improvement of ICT integration in education	49(98)	1(2)	0(0)	1.4(0.5)
Establish a strong supervision on ICT integration as a solution for the improvement of ICT integration in education	44(88)	6(12)	0(0)	1.6(0.6)
Regularly train lecturers in ICT as a solution for the improvement of ICT integration in education	50(100)	0(0)	0(0)	1.3(0.4)
Provide relevant software as a solution for the improvement of ICT integration in education	47(94)	3(6)	0(0)	1.5(0.6)
Reduce the number of students in class as a solution for the improvement of ICT integration in education	43(86)	7(14)	0(0)	1.6(0.7)
Increase the ICT infrastructure as a solution for the improvement of ICT integration in education	49(98)	1(2)	0(0)	1.4(0.5)
Provide technical support as a solution for the improvement of ICT integration in education	49(98)	0(0)	1(2)	1.5(0.5)
Reduce the lecturer's workload as a solution for the improvement of ICT integration in education	32(64)	17(34)	1(2)	2.0(0.9)
Increase connectivity as a solution for the improvement of ICT integration in education	50(100)	0(0)	0(0)	1.4(0.4)
Increase administrative support	49(98)	1(2)	0(0)	1.4(0.5)

Source: Primary data

SAg&Ag=Strongly Agree& Agree **NeuT=** Neutral

Dis&Sdis= Disagree& Strongly Disagree **M(STDEV)=** Mean(Standard Deviation)

This table shows unanimity (100%) of agreement for the provision of computers to students and also the increase of connectivity. As both go hand-in-hand; respondents also have put trust in them as possible solutions to the lack of enough computers to students and also slow network that had been mentioned as focal obstacles to the ICT integration in education.

As it is for scheduling time-table for ICT for all the students, the increase of ICT infrastructure and administrative & technical support were also shored up to

a level of 98% as helping answers to the challenges of time and infrastructure constraints in ICT integration. 47(94%) of respondents supported the provision of relevant and updated software as also one solution among others that can be applied to solve ICT integration problems. In addition to this, as also agreed with students' views; strong supervision is required (88%) to help the users of ICT be sure that they are doing the right thing at the right time. Drawing to a close of these comments, the reduction of student numbers and make it manageable in class was also suggested to the level of 86%; this would help much in the integration of ICT in education.

Lecturers and students' responsibility in the ICT integration

The lecturers' hand or role played in the ICT integration or the way they use ICT resources conscientiously to stimulate their students learn properly from them, was also argued about. Here lecturers reported that they indicate and advise students to use some links and post some documents on the internet, give them soft notes (handout) or even giving them assignments that require internet search for references and to be submitted on email or by typing and printing.

As an example, one reported:

> The way I help my students use ICT, I do it by inculcating them how to use their own computers for academic purposes. For case in point, I urge and request them to use social networks like watsap, facebook, instagram and the like for academic purposes. It is in this move that we have created a watsap group where we discuss on some topics covered in class.

To this practical exercise of integrating ICT or helping student - teachers do so; some lecturers said that they do nothing to integrate ICT because that is the task of the computer science department. To them, the only make use the microphones and loud speakers and projectors for big classes. The rest of technology insertion is for computer science men and women. From this view, it is clear that the one who has this kind of thinking has limited knowledge and skills in the domain because the use of microphones, loud speakers and projectors is part and personal ICT utilization in their teaching. Another interesting initiative that came from the way lecturers use or guide students use ICT in education was allowing them to use ICT on their own for academic rationale. As an evidence, one reported:

> I ask them to record themselves when preparing for presentation in order to keep their recorded presentations and playing them for self-correction. I also advise them to use their smart phones to check up words for meaning, spelling, and pronunciation using onelook dictionary online.

This noticeably would stimulate or provoke students' attention and curiosity to use ICT for them and make it their daily or regular an essential learning resource. As it facilitates them learn more from the less taught by the teacher as the saying by one researcher who said that "Any technology that increases the rate of learning would enable the teacher to teach less and the learner to learn more".

For the students, when asked how responsibly they use the opportunities to facilitate the ICT integration and benefit from it academically (in their learning), students presented various views including that they pay their own money and visit cyber cafes to search learning information on the internet and they also try to use social media like Facebook, Wattsap, twitter and others to get opportunity to share with their friends from other campuses. This makes them more active participants in their learning; something that concurs with the constructivist view of learning where learners cease to be consumers of knowledge and passive recipients of the learning process; rather they play a key role as the centres and constructors of their own knowledge through exposure and interactions with peers and also guided or mentored by experienced professionals (teachers/facilitators).

VI. CONCLUSION

This research explored ICT opportunities and challenges that obstruct or get in the way of integrating ICT in educational curriculum. It also tackled how fruitfully those opportunities were taken advantage of and the promising solutions that would rectify those challenges. After collecting data, the facts gathered revealed that there are various ICT opportunities that the college have such as computers(though the not enough) which are used by students in the computer lab, slide projectors that help lecturers project their summaries while they are teaching in classrooms; loud speakers that serve to teach largely populated classes; mobile phones and internet sharing through which students and lecturers exchange information on different courses and class assignments. In addition, the use of personal computer, especially by lecturers was a key resource that is very useful for their research, daily preparation of courses, assignments and exams. It was demonstrated that different lecturers and students utilize those ICT opportunities fruitfully and these ways include the provision of class assignments that necessitate students

to go and do online search and submit them through email or print them.

On the part of the challenges, the study revealed a variety of challenges including the limited knowledge and skills in ICT usage; lack of enough computers; supervision and assistance from both administrative and support staff; a big workload that is subjected to lecturers and brings them to lecture and leave students their time to search for more information; very huge classes that are too populated to the extent that people need loud speakers to reach all the corners of the classroom; weak ICT infrastructure and sometimes slow network that also slows down the interactive ways through which lecturers and students would cooperate and share teaching and learning information. As possible solutions to those barriers; the data showed that there is a need for provision of enough computers to students; the increase of connectivity and other ICT infrastructure; the reduction of lecturers' workload and number of students in one classroom; all these would help students cope with this technological world.

Taken all in all, it is noticeable that ICT integration in educational curriculum is requires a lot of resources and tools to be used and-in-hand from which if there are hindering challenges that impede that implementation, it never achieves its desired objectives. The results from this study indicate that lecturers and students from the College of Education commonly agree on some of challenges like big number of students in classrooms, slow connectivity; insufficiency of computers to students and the lack of relevant knowledge and skills to incorporate ICT in whatever they do and they also, together, disregarded students' and lecturers' negative attitudes as one of the possible challenge to be taken into consideration. In the line of solving these obstacles, they also inanimately suggest the bump up of computers to the students' numbers or making the student-computer ratio reasonable and even reducing students in classrooms; the raise of internet connectivity and strong ICT infrastructure together with the support from administration and technicians with a hope that if those challenges are addressed accordingly; the ICT would be rewardingly integrated to the best.

In the light to the above findings and related conclusions, students are recommended to: 1. Try to bring their own ICT devices for their learning than waiting everything from the government. Lecturers are urged to: 1. Use responsibly the ICT resources available and request those they don't have because no one is a mind-reader to guess what they need to perform their job better. 2. Try their level best to be flexible and avoid the resistance to change towards the use of ICT in their teaching-leaning activities so that they can embrace any new change as technologies keep changing. 3. Apply the knowledge and skills they have been trained for especially in ICT integration. 4. Share their teaching materials through ICT for easy access by the students. Added to what is recommended to students, the UR-College of Education administration should: 1. Work out on the lecturers' workload and see how it can be adjusted to help them devote their time to the ICT usage in their educational activities. 2. Try to minimize the number of students per class so that learning environment becomes conducive 3. Conduct training need assessment in order to offer relevant ICT training that lecturers would practically apply 4. Officially request lecturers to post or avail their content online to help students access them easily. 5. Design a "DUAL-MODE POLICY: governing face to face and online where students can either learn from face to face classroom or on their own having given all the necessities. 6. Purchase and make use of important and relevant softwares, interactive whiteboards, and other required ICT infrastructure and provide enough assistance and supervision to make sure of their effective use. All this can be done in a bid to carry out the teaching and learning exercise in the way that fits the world today. Since this study was conducted in 2016, related studies could be carried out to look into the nature of the situation today. More research should also look into the workability of "Dual – mode policy" as it was suggested among possible remedies to the examined challenges in this study.

Though this research was higher leaning institution-based research; this would not imply that its findings are to be taken a broad view to other institutions. Nor can't results in this study be generalized. Regardless of the significance for this research in teaching - learning, conducting this research took a limited time to the level that all the college students were not contacted; therefore a thorough study can be conducted in a specified case study to find how the college manages online learning. As undergraduate students were the target for this study, there is a need to carry similar study involving the postgraduate studies within the same college.

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