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THE INTEGRATION OF E-LEARNING ON TEACHERS' PROFESSIONAL DEVELOPMENT: CASE OF GTTC MBALMAYO, CENTRE REGION

A Master Dissertation Submitted in Partial Fulfillment of the Requirements for the Award of a Master's Degree in Management of Education

Specialization: Planning

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CERTIFICATION

This is to certify that this work title **"The Integration of E-learning on Teachers' Professional Development: Case of GTTC of Mbalmayo**" is carried out by **CHUYONG VERA BERI Matricule No. 19Y3491**. This work is original and no part of it has been published in this institution or a different institution by another researcher.

I dedicate this work to the BUFUNGG and CHUYONG’s Family

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ABSTRACT

In order for teachers to improve professional development, e-learning is a very important key. Most schools globally are struggling to enhance teachers' professional development. The main hypothesis of this study says that the integration of e-learning influences teachers' professional development in GTTC of Mbalmayo. E-learning is operationalized to digital classroom, ICT in education, the use of internet and ICT infrastructure. In this study, The Constructivism Theory and Facilitation Theory were applied across the whole research. The study adopted the descriptive research design. The population of the study was 152 teachers in GTTC of Mbalmayo. Both primary and secondary data were used in making factual decisions. The questionnaire was used to collect the Primary data. Data analysis was done using the SPSS Version 22. Data was analyzed by using descriptive statistical methods like the mean, averages and percentages. Data was presented using tables. ICT Infrastructure has the highest influence on teachers' professional development as represented by 0.488, followed by digital classroom as represented by 0.418, followed by the use of the internet as represented by 0.265 and ICT in Education as represented by 0.194. All the four variables were noted to have a positive influence on teachers' professional development in GTTC of Mbalmayo. Digital classroom, ICT in education, the use of internet and ICT infrastructure positively impact teachers' professional development.

Keywords: integration, e-learning, teachers, professional development

RESUME

Pour que les enseignants améliorent leur développement professionnel, l'apprentissage e-learning est une clé très importante. La plupart des écoles dans le monde luttent pour améliorer le développement professionnel des enseignants. L'hypothèse principale de cette étude est que l'intégration du e-learning influence le développement professionnel des enseignants dans l'école normale des instituteurs de l'enseignement général (ENIEG) de Mbalmayo. L'apprentissage e-learning est opérationnalisé à la salle de classe numérique, TIC en l'éducation, l'utilisation d'internet et les infrastructures de TIC. Dans cette étude, la théorie du constructivisme et la théorie de la facilitation ont appliquées dans l'ensemble de la recherche. L'étude a adopté l'approche descriptive. La population de l'étude est 152 enseignants à l'ENIEG de Mbalmayo. Les données primaires et secondaires sont utilisées pour prendre des décisions factuelles. Le questionnaire est utilisé pour collecter les données primaires. L'analyse des données est effectuée à l'aide de la version 22 de SPSS. Les données sont analysées à l'aide des méthodes statistiques descriptives telles que la moyenne, les moyennes et les pourcentages. Les données sont présentées à l'aide de tableaux. L'infrastructure des TIC a la plus grande influence sur le développement professionnel des enseignants, représentée par 0,488, suivie de la classe numérique représentée par 0,418, suivie de l'utilisation d'internet représentée par 0,265 et des TIC en l'éducation représentées par 0,194. Il est noté que les quatre variables ont une influence positive sur le développement professionnel des enseignants dans à l'ENIEG de Mbalmayo. La classe numérique, les TIC en l'éducation, l'utilisation d'internet et des infrastructures TIC ont un impact positif sur le développement professionnel des enseignants.

Mots clés **:** intégration, e-learning, enseignants, développement professionnel

ABBREVIATIONS

A	Agreed
ACL	Asynchronous Collaborative Learning
AEL	Asynchronous Experiential Learning
BL	Blended Learning
CAN	Campus Area Network
CBDI	Computer-Based Direct Instruction
CD-ROM	Compact Disc Read-Only Memory
CPD	Continuing Professional Development
DL	Distance Learning
D	Disagree
EL	Electronic Learning
GTTC	Government Teacher Training College
IBPS	Internet Based Problem Solving
ICT	Information and communication technologies
IP	Internet Protocol
ITV	Interactive Video Television
IVC	Interactive Video Conferencing
LAN	Local Area Network
LMS	Learning Management System
N	Neither
NEPAD	New Partnership for African Development
OCR	Online Content Representation
OL	online learning

OLE	Online Learning Environments
PAN	Personal Area Network
PCs	Personal computers
PDAs	Personal Digital Assistants
SA	Strongly Agree
SD	Strongly Disagreed
SDL	Self-directed Learning
SPSS	Statistical Product and Service Solution
TPD	Teacher professional development
TVs	Televisions
WAN	Wide Area Network

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CHAPTER ONE

BACKGROUND OF THE STUDY

Conceptual Background

It is important to say that e-learning has become the protagonist for change in the educational sector (Fanso & Ngwa, 2022). Its approaches and applications, which are supported by pervasive technologies, possess potential benefits for the educational sector and the society as a whole. In order to reap maximum benefits from today's rapid technological advances (Ndongfack, 2015), Burns (2019) says that teachers need to embark on a program of professional development that is experiential, incremental, and supportive of pedagogic improvement and practice. Teachers must continually improve their strategies and methods in order to remain viable and relevant (Ndongfack, 2015). However, Murphy, Anzalone, Bosch and Moulton, (2002) highlight that progressive consideration must be given to the needs of prospective teachers who like using technology, the ways in which it will be used, the curriculum objectives, the social context and the ways in which teaching and learning activities are organized. This study is premised on the fact that the initial professional development of prospective teachers is very important for teaching and learning with ICTs in the later years (Ndongfack, 2016).

Its pervasive technologies-enabled techniques and applications have the potential to improve both the educational sector and society as a whole. In order to get the most out of today's rapid technology advancements (Towndrow, 2005). Teachers must begin a professional development program that is immersive, gradual, and supportive of pedagogical improvement and practice (Fanso & Ngwa, 2022). Ndongfack believes that in order to remain viable and relevant, teachers must constantly enhance their strategies and methods (Ndongfack, 2015). Prospective teachers use technology, as well as the ways in which it will be used, the curricular objectives, the social setting, and the ways in which teaching and learning activities are arranged, must all be given careful attention. This research is based on the idea that initial professional development for prospective

teachers is critical for subsequent years of teaching and learning with ICTs (Kibinkiri, 2014).

Despite progress in understanding ICTs in governance, business, and development, there is still a lot to learn about the concept and practice of e-learning in educational institutions. E-learning, on the other hand, is difficult to define because it is multifaceted and dynamic, changing according to environment, occasion, and interest. As a result, there are various types of e-learning. E-learning basically involves use and application of information and communication technologies (ICT) at web sites, personal computers (PCs), tablet PCs, cell phones, learning management system (LMS), televisions (TVs), radios and other means to improve teaching and learning processes. E-learning is really a unifying phrase accustomed to explain the areas associated with the internet, web-based instruction and technologies directions (Oye, Salleh and Iahad, 2010). In that respect, e-learning is substantially becoming a learning strategy in the realms of teaching, practical learning, skills training and development and many corporate functions as evidenced by massive development of web technologies. Naidu (2003) defines e-learning as "the systematic use of networked information and communication technology in teaching and learning". As a result, e-learning is a broad word that encompasses computer-assisted learning as well as the use of mobile technology like PDAs and MP3 players to aid learning.

The terms e-learning and online learning have emerged to describe the use of Information and Communication Technologies (ICTs) to improve distance education, implement open learning policies, make learning activities more flexible, and distribute those learning activities across multiple learning venues (Hennessy, Onguko, Harrison, Kiforo, Namalefe, & Naseem, 2010). E-learning, online learning (OL), and distance learning (DL) all refer to the same process (Fanso & Ngwa, 2022). Agarwal (2013) wrote "Online learning or e-learning is a field of education that focuses on the dissemination of knowledge and information to different geographical locations" (p. 2). As a formalized teaching system specifically designed to be carried out remotely, distance learning has

become a very popular learning element in all universities around the world. Facilitated through the Internet and Web portals, distance learning has been a significant trend in the repertoire of learning opportunities that will be provided by most educational institutions in the future. More than ever, it is clear that "e-learning is an important element of future education as it provides a comfortable, easy, fast, and affordable learning environment" (Agarwal, 2013, P. 67).

Teacher professional development (TPD) is a topic widely discussed. According to the literature review, the TPD models mostly used are one- or two-day workshops. As teachers are expected to be life-long learners, their TPD focus on providing an ongoing learning-a continuous form of professional development. E-learning offers learners the ability to gain knowledge and skills with regard to computers and the Internet that can be transferred and applied to other facets of student life; for instance, participating in a business meeting via video conferencing (Al Naheef & Ramadan, 2012).). Also, the technology used in an e-learning program allows students to have the flexibility to schedule a time that is convenient for them. For example, if students have another obligation such as work or a family situation that would cause them to miss a traditional class, they can reschedule the class in an e-learning environment.

The recent and evolving way of learning in the global classroom has been realized in quite a number of universities, particularly in developed countries. Abdul Aziz & Mohammed, (2012) mentioned e-learning as an emerging global network typically used for teaching and training. Given the expansion of e-learning, this study investigated how the student-teachers perceptions of e-learning, and the problems they face in implementing e-learning with regard to leadership concerns of access to e-learning government teacher training colleges (GTTCs).

Most training schools in Cameroon are the responsibility of the government. There are also schools which are managed by private individuals, universities, pressure groups, religious bodies and foreign communities. The majority of training schools in Cameroon

offer program. Before the turn of the century, teachers training colleges school students lacked the knowledge of information and communication technologies and its numerous advantages that that we have now. The use of the chalk and board, pictorial charts, drawings and imaginations was used to buttress learning experiences in those days. There was no physical contact with technologies that have now come to improve our knowledge and experiences.

The integration of technological awareness and learning in teacher training college is today making significant strides towards use of more interactive e-learning strategies to effectively enhance overall performance of college teachers and their trained personnel (Fanso & Ngwa, 2022). In many developed economies, several academic institutions make use of extremely interactive e-learning that directly enhances students' performance (Soleymanpour, Khalkhali and Reayatkoonandeh, 2010). In the recent era, technologies have indeed become devices accustomed to get rid of physical obstacles and allow students to learn at anytime and anywhere without having physical interaction with the instructor. Against this background, e-Learning therefore improves easy access to effective teaching and learning, and thus enhancing students' academic efficiency.

According to Heeger (2010), e-learning enables numerous secondary school students to take similar programs concurrently. Nowadays, educational systems have grown to enjoy the reasonable instructions in addition to their learning. Research findings indicate that e-learning systems permit instruction method geared to improve top quality related to instruction and students' academic achievement. Soleymanpour, Khalkhali and Reayatkoonandeh (2010) further elaborate that those private secondary school that have demonstrated remarkable use of e-learning generally perform quite much better than student counterparts who much rely on use of face-to-face communications and physical interactions with their instructors.

GTTC students who generally participate in online or e-learning achieve far better amounts compared to GTTC students who examined traditional methods. Due to

emergence of advancements in educational technology, e- learning is currently gaining substantial attention in education and for this reason; several educational institutions are now pursuing application of electronic learning programs. As such, e-learning is continuously becoming well-established in a number of both private and public education institutions in the world nowadays. Most of these education institutions have become aware of the impacts related to e-learning on students' academic achievement.

A broad range of learning approaches exists already, for example, e-learning, blended learning, and distance learning which utilize ICT. The use of ICT can benefit, for example, students in rural areas by having them attend classes as distance learners and motivating them to learn. Regarding this, the potential of e-learning seems very assuring, but because of gaps between developed and developing countries knowledge transfer is not only difficult but also costly. There is little systematic research into the overall effectiveness of e-learning as a learning medium despite the great interest in it, while there is much more work to be done, a variety of e-learning courses aimed at making sustainable development a reality has been developed and demonstrate how e-learning can reach thousands if not millions of minds and potentially plant the seeds of change (Lumadi & Len, 2013).

According to case studies, there are already a number of e-learning programs offered in developing countries. These programs are developed by various national and international initiatives. The growth of e-learning programs according to (Lockwood & Gooley, 2002) is driven by the need for and potential of providing education in less expensive ways, increased access to information, effective learning and greater flexibility.

The availability of learning resources has far reaching effects on the learning process. This present study was used as an integral tool to assess whether resources in terms of computers and other technological infrastructure are adequate. For e-learning to be sustained, adequate and modern resources are essential from the very beginning of the program (Blake, 2009).

Furthermore, e-learning as a teaching and learning approach has the potential to transform Cameroon's educational process. In reality, it has the potential to provide student-teachers and instructors with a plethora of possibilities to hone their skills and contribute to the growth of their communities. E-learning, where instructions may be supplied via all electronic media, particularly the Web, could be one of the solutions to our educational difficulties today. The fact that the majority of student-teachers and their lecturers are unaware of the possibilities of this strategy or method is particularly concerning. E-learning first appeared in the late 1990s. However, some of its features were already taking place before to it. Then there was correspondence education. After then, there was remote learning. The breadth and status of e-learning are evolving on a daily basis due to ongoing changes brought on by new technology, hardware, and software.

Again, e-learning is a multi-faceted and all-encompassing phrase that varies based on context and the availability of appropriate technologies or ICT infrastructure (ICI). As far as this project is concerned, e-learning is a modern teaching and learning strategy or method that includes Computer-Based Direct Instruction, Asynchronous Experiential Learning, Asynchronous Collaborative Learning, Internet-Based Problem Solving, Online Content Representation, and Online Learning Environments. Blended learning is also used in this study. Internet, handheld devices (PDAs, simple mobile phones, smart phones, and Tablets), television, and digital radio are among the electronic applications and processes involved (Merlyne, 2021). The study recognizes that technology alone will not provide much help in education, and that e-learning is a means to an end rather than an end in itself. Ndongfack (2010), believes that basic academic skills, particularly reading and communication skills, are an important aspect of e-Learning preparedness.

Finally, in order to face the demands of an ever-evolving high-tech society, this research aims to determine the impact of e-learning on the professional growth teachers. More specifically, the impact of e-learning on prospective teachers' communication skills, learning-related technical skills, interactivity/interpersonal skills, attitudes toward

learning with technology, support received by ICT teachers, values and principles appropriate for 21st-century learning, performance in educational technology, and the challenges teachers face in implementing e-learning.

Historical Background

E-Learning is increasingly becoming the norm around the world partly because it is driven by information technology in Cameroon. The integration of electronic technology into pedagogy is motivated by the determination of stakeholders to improve the efficiency of a hybrid educational system that combined the distance and in person learning perspectives (Fanso & Ngwa, 2022). Nevertheless, the integration of ICT in the teaching and learning process in Cameroon, a microcosm of the African state, is still at its embryonic stage (Nsolly & Charlotte, 2016). It is therefore not surprising that the concept of distance learning is faced with significant challenges in terms of appeal and efficiency, despite its known advantages to enhance education and academic training (Fanso & Ngwa, 2022). The overall goal of e-learning is to reach learners who cannot participate in traditional in person classes due to the prevalence of the COVID-19 pandemic by using ICT tools.

The challenge and inability to effectively enforce social distancing, as a key preventive measure, prompted the immediate and spontaneous shutdown of schools and public institutions nationwide in Cameroon. As a unanimous response to contain the pandemic, the international community through various governments opted for total or partial confinement to control the rapid spread of the virus. This required a move from traditional classroom teaching and learning to online teaching and learning or e-learning which according to UNESCO experts is learning through the internet and multimedia (Yanuschik, Pakhomova & Batbold, 2015).

After a set of radical measures that included the closure of academic institutions across the country to curb the spread of this virus in Cameroon, the government decided to put in place e-learning strategies to uphold the educational sector. Nevertheless, to guarantee the continuity of education, public and private academic actors in Cameroon

realized the urgent need to quickly switch to digital pedagogy in order to familiarize Cameroonian educational stakeholders with pedagogical practices that integrate ICT (Béché, 2019). Adopting distance learning or e-learning strategies, proved challenging to implement at various levels given a the relatively low internet penetration rate in Cameroon (Tchamabe, 2011). The low internet penetration into Cameroon's educational system thus explains the recent launch of a learning platform called Ohipopo in 2019 (Ngwa, 2020). Ohipopo is the first online learning platform customized for the Cameroonian system of education. The creation of more educational digital platforms and websites by young talented Cameroonians followed including www.eduairbox.com, www.sims.cm, www.treehouse, www.learneverywhere.org, and www.cam-educ.com (Ngwa, 2020). The dilemma of effectively implementing e-learning inspired us to analyze, in this paper, the effectiveness of the e-learning strategies put in place in Cameroon during the coronavirus crisis. Within the context of this study, it is important to note that during the COVID-19 crisis, so many countries in the world implemented a range of measures to curb the educational impact of the pandemic (Reimers et al., 2020).

In Cameroon, the situation has not been different, given that policymakers and education stakeholders had to bring to a halt every physical contact between learners and teachers. The imminent suspension of regular classroom lessons had severe negative effects on the educational sector in Cameroon, especially in terms of program coverage and skills acquisition. However, online teaching and learning were introduced by the Cameroon ministry of secondary education to help mitigate the nefarious impact of the COVID-19 pandemic on the attainment of educational objectives. Many school administrators including state media (CRTV) have stated severely that online teaching and learning were carried out in order to contribute to educational quality in terms of knowledge acquisition. This, the government saw as the best way to uphold the educational sector in Cameroon, though many learners especially in rural contexts may find themselves excluded from schooling and unable to access online resources due to the unavailability of infrastructure, electricity, electronic gadgets, and the lack qualified

teachers who can assist with online learning (Dube, 2020). It appears that online learning favors urban and well-privileged learners; thus, widening the gap between the poor and the rich, instead of uniting the nation in the fight against COVID-19 (Dube, 2020). As a result, numerous questions continue to plague the minds of stakeholders as far as the effectiveness of this acclaimed online teaching is concerned. It is very unlikely that elearning will on average replace the learning time lost from regular schooling (Burgess and Henrik, 2020). There will likely be substantial disparities between families regarding the extent to which they can guide their children during the learning process.

The rapid growth in technology has had critical implications for education systems worldwide. The little existing knowledge of education systems is undergoing rapid obsolescence, and moreover, the population is increasing to the point where education systems are facing a great challenge of becoming out of date (Abdulaziz & Hasan 2018). One possible solution to this outcome is to develop a system of education designed to use new technology. Traditionally, EL was primarily designed to serve older students who may have missed an opportunity for higher education. However, things have changed in recent years whereby e-learning is the preferred mode of study for many students, not only older ones but also younger learners. “In this regard, e-learning is shaking up education as it is offering a solution to distance, time, and education gaps as well as cost problems (Al Astal, 2013).

The problems involved in this kind of education are becoming more complex. Some of these problems include insufficiently qualified staff, an insufficient infrastructure and ineffective teaching and learning strategies. The direct result is always poor outcomes to educational investments. Consequently, strategies to attend to these problems must be viewed in a multidimensional or multifaceted manner with respect to the context and the availability of means. However, the professional development of student teachers must be the first priority for the country to solve its existing and future educational problems. This is the key to education for sustainable development (Dallas, 2010).

Theoretical Background

The Constructivism Theory – Jean Piaget (1972) and Jerome Bruner (1990) Facilitation Theory Carl Rogers (1980) and other main concepts are discussed as well.

Constructivism is the theory that construct knowledge, through experiencing things and reflecting on those experiences. When teachers encounter something new, they reconcile it with previous knowledge and experience. They may change what they believe, or they may discard the new information as irrelevant. To be active creators of their knowledge however, they must be able to ask questions, explore and assess what they know. In the classroom, the constructivist view of learning means encouraging teachers to use active techniques such as experiments and real-world problem solving and to create knowledge and reflect on their understanding.

Furthermore, the incorporation of ICTs into educational practices promises more benefits to education and has the potential to change the existing paradigms. These tools have influenced the development of new models, strategies and methods of teaching and learning in education. Agarwal (2013, P. 67) affirms that the emergence of new educational technologies has catalyzed fresh discussions of educational theory and practice. As a matter of fact, current educational developments all over the world are being driven by ICTs. These technologies have changed the way in which people think and behave in society. Worthy of note is the fact that pupils and students in Cameroon, like in other developing countries, have a strong passion to own and use ICT gadgets as their prices and services offered decrease on a daily basis.

Despite increased understanding of ICTs in governance, business and in the development process, there is still much to be learned about the concept and practice of e-learning in education especially in teacher education. ICTs have increased students' interest in learning, but have not changed the basic structure of the teaching-learning process –the daily activities in the average classroom. For example, the whole-class, time-based lecturing method still dominates in most classrooms. E-learning has the potential to change education in Cameroon. As a matter of fact, it has the capacity to

offer student teachers and teachers numerous opportunities to develop their talents so that they can contribute to the development of their communities.

Contextual Background

The Republic of Cameroon is a Central African nation on the Gulf of Guinea, bordered to the North-West by Nigeria, to the east by Chad and the Central African Republic, and to the south by Equatorial Guinea, Gabon and the Democratic Republic of the Congo (Brazzaville). Cameroon is a member of the Economic Community of Central African States (ECCAS), the Economic and Monetary Community of Central Africa (CEMAC) and the Council for Peace and Security in Central Africa (COPAX), as well as the African Union.

The current population of Cameroon is 28,404,448 as of Thursday, April 27, 2023, based on Worldometer elaboration of the latest United Nations data. People between the ages of 15 and 60 constitute 58% of the population, with an annual growth rate of 2.4% (Republic of Cameroon, 2013). Cameroon's Education Sector Strategy Paper observed that, for the 2010–2020 period, the annual growth rate was predicted at 2.1%, corresponding to a yearly increase of about 420,000 inhabitants. This increase is high among the youth. Since the youth account for more than 50% of this population, it can rightly be expected that demand for education should rise, requiring the government to respond accordingly, by opening more schools, providing infrastructure and equipment, and allocating human, financial and material resources.

Although originally colonized by the Germans, present-day Cameroon became a League of Nations mandate territory after the defeat of Germany in World War I. For administrative purposes, the territory was split between the French and the British, a division that was only resolved in 1961 when the two parts were re-united in an independent federal republic. Although there are over 250 indigenous languages in Cameroon, the colonial legacy is still evident in the use of European languages for administrative purposes. Of the country's 10 regions (see Figure 1), the Northwest and

Southwest regions are predominantly English-speaking, while the rest are French speaking. Cameroon is a member of both the Commonwealth of Nations and the Organisation Internationale de la Francophonie (OIF).

Entry into higher education institutions is direct, with no competitive entrance examination for holders of the Baccalauréat or GCE A/L. For entry into higher training schools of the public service (as well as into certain private institutions), candidates must succeed in a competitive entrance examination. Higher education is sub-divided into three levels in compliance with the BMD system (Bachelor's, Master's and Doctorate) adopted in 2007. The Bachelor degree takes three years, the Master's two years and the Doctorate three years.

Literacy and non-formal basic education offer alternatives for education and training in the non-formal sector. Literacy covers activities aimed at acquiring the ability to read, write and count, and at developing daily life skills and income-generating activities (IGA). Non-formal basic education is designed for children with no schooling or who are early drop-outs, to enable them to continue with school (if they have what it takes to do so) or to solicit vocational training in a given discipline. Adult literacy activities take place in formal literacy centres (CAF), while those related to non-formal basic education for unenrolled children are done in non-formal centres for basic education (CEBNF).

The Cameroon educational system has witnessed consistent evolution in its policies, strategies, methods, pedagogical resources and practices marked by its political evolution and exigencies. However, to effectively study the ideas and developments that have shaped educational practices in order to conceptualize initial professional training in Cameroon's schools, it is imperative to briefly examine its history. Education in Cameroon has a long history. Indigenous African societies including Cameroon had their own system of educating and training younger ones which included the use of pedagogical resources before the introduction of a western type of education (Mutendwahothe and Kibinkiri, 2013). The type of training received by Africans was

called indigenous education, because it was part and parcel of the society. These African practices were not printed or recorded in books. Thus, the West referred to that kind of education as "primitive education" because it lacked backup documentation (Mutendwahothe and Kibinkiri, 2013).

Globally, the basic operations of institutions lie in the provision of appropriate and reliable academic education consisting of teaching, research and service (Beebe, 2004; Boulton and Lucas, 2011; Cloete and Maasen, 2015). Through ICT, the provision of access to knowledge anywhere and anytime as well as opportunities for networking and communications for knowledge sharing, participation, and lifelong education is guaranteed (Buabeng-Andoh, 2012; Asabere, 2013). Developed nations in the world have made significant applications of ICT in their daily activities. This is however relatively slow in developing nations such as Cameroon. In developed nations, these new technologies and approaches are having a positive impact on education.

Though the application of ICT may be slow, measures are placed to guarantee that proliferation of ICT integration in education is made possible. Cameroon is also enforcing the integration of ICT in various areas such as governance, education and research (Yidana, 2007). Through connection of institutions has provided a means of carrying out research through the increase of Internet bandwidth, enabling researchers to collaborate with each other by providing ICT resources (Mkandawire, 2013).

More importantly, ICT usage has become the baseline internationally (Nawaz and Kundi, 2010). This is because more computers are being linked to the global network (Internet) as a means of exchanging of information. It is necessary for Cameroon to be part of this network, in order to benefit from the information, it provides, to increase our knowledge or share our knowledge with others. The integration of ICT into research is essential for information needed by both students and lecturers to conduct their research. Since integration of ICT has become the baseline in all aspect of education, information needed is now mostly found on the Internet and an organization's local network.

Though, African education was a process which enabled society to teach its younger ones the life patterns of the society so that they could live successfully within the context of their culture. The main objective of this kind of education was to train and integrate children into the working population. Hunzicker (2011) points out that African education consisted of activities aimed at developing children's motor or physical skills used for construction, farming, pottery, weaving, hunting, and carving; character and moral training; intellectual skills; vocational development and the development of a sense of belonging and cultural heritage. He, furthermore, argues that "traditional African education addressed issues of modern education particularly, with reference to the transmission of the cultural heritage in view of continuity and growth for the regulation of life in the society" (Jung, 2012). Falola Kim, (2013) highlights that the learning process was a cultural activity and collective affair involving the task of socializing.

More still, the education process involved the use of rudimentary tools, life-long learning, oral learning, storytelling, collaborative learning, community-based, informal processes. It responded to societal needs since it focused on providing knowledge, skills and attitudes for immediate consumption (Mutendwahothe and Kibinkiri, 2013). Unfortunately, reforms in education over the years seemed to overlook their historical base just as colonial education policies ignored and downgraded African cultural knowledge and practices that influenced indigenous education (Dallas, 2010, p. 152). According to Tamanji (2011, p. 320) the collaboration between the colonial governments and the western Christian missionaries resulted in the establishment of colonial formal schools in Cameroon. Consequently, Formal education in Cameroon is closely linked to the West through trade, Evangelisation and colonization (Mutendwahothe and Kibinkiri, 2013).

Statement Of Problem

There is an urgent need to improve the quality and the quantity of teachers in institutions of learning at all levels of education and professional development in Cameroon. According to Cameroon/World bank Report (2012, p.32) the ban on

recruiting teachers in Cameroon throughout the 1990s following the structural adjustment programmes that targeted the salaries of teachers and civil servants during the 1980s and 1990s created a vacuum or gab in the educational sector. Years later, the government introduced a contract teacher program in primary education which aimed at incorporating all non-civil servant teachers into a single group of contract teachers. That is locally recruited teachers by the Parent Teacher Association (PTA) and those employed in the private sector were to eventually join the official contract-teacher class. Although this program supported by the international community has led to an increase in the number of teachers over the years. A study carried out by the Ministry of Secondary education in 2012 to find out the projected number of student-teachers that will be in Government Teacher Training Colleges and the number that would be needed to teach in Government Primary Schools in Cameroon between 2013 and 2020 corroborate the previous assertion. The expected number of students needed by the government in each year is in line with the budget that would be allocated to this sector.

Furthermore, teacher education institutions are faced with a multiplicity of challenges such as: large classroom size; insufficient infrastructure; the introduction of new disciplines like ICT in the curriculum without a corresponding staff to teach; insufficient pedagogic resources; and most importantly ineffective methods and strategies of teaching and learning. Unfortunately, most of the projects especially in the domain of ICTs conceived in basic and secondary education pay little attention to the initial training of student teachers in teacher education institutions. The direct result is poor outcomes to educational investment. Tchombe (2004) states that “how learning occurs and is supported has implications for the level of participation and the quality of the end product. Worthy of note is the fact that the solution to the problem of education in Cameroon can only be solved progressively when all the challenges facing this sector have been addressed.

Moreover, just as the twin needs to improve the quality and the quantity of teachers become imperative, new strategies and methods of teaching and learning are

becoming available thanks to the penetration of Information and Communication Technologies (ICTs) in the educational system. Despite the growth in understanding ICTs in governance, business and in the development process, there is still much not known about the practice of e-Learning in institutions of learning especially teacher education establishments. It is for this reason that we are examining the integration of e-learning on professional development of student teachers, the case of GTTC of Mbalmayo, Centre Region. Precisely, we are investigating the integration of e-learning on teachers' professional development. That is, the knowledge, skills and attitudes suitable for learning in the 21st century that teachers' can build with e-learning and the positive change that can result from this modern method or strategy of teaching to address the problems of education in Cameroon.

Objective of the Study

To carry out this research on the integration of e-learning on teachers' professional development in GTTC of Mbalmayo and the main and the specific objectives are formulated.

Main of Objective

To investigate the integration of e-learning on teachers' professional development GTTCs of Mbalmayo.

Specific Objectives

1 To Ascertain digital classroom on teachers' professional development in GTTC of Mbalmayo
2 To valorize ICT in education on teachers' professional development in GTTC of Mbalmayo
3 To examine the use of internet and teachers' professional development in GTTC of Mbalmayo
4 To examine how ICT infrastructure fosters teachers' professional development in GTTC of Mbalmayo.

Research Question

To carry out this research on the integration of e-learning on teachers' professional development in GTTC of Mbalmayo and the main and the specific research questions are formulated.

Main research Question

In what ways does the integration of e-learning influence teachers' professional development in GTTC of Mbalmayo?

Specific Research Questions

1. Does digital classroom enhance teachers' professional development in GTTC of Mbalmayo?
2. Does ICT in education increase teachers' professional development in GTTC of Mbalmayo?
3. How does the use of the internet improve teachers' professional development in GTTC of Mbalmayo?
4. To what extend does ICT infrastructure foster teachers' professional development in GTTC of Mbalmayo?

Research Hypothesis

To carry out this research on the integration of e-learning on teachers' professional development in GTTC of Mbalmayo, and the main and specific hypotheses are formulated.

Main Hypothesis

Integration of e-learning influences teachers' professional development in GTTC of Mbalmayo

Specific Research Hypotheses

1. **Ha1:** Digital classroom enhances teachers' professional development in GTTC of Mbalmayo.
2. **Ha2:** ICT in education increases teachers' professional development in GTTC of Mbalmayo.
3. **Ha3:** The use of internet improves teachers 'professional development in GTTC of Mbalmayo.
4. **Ha4**: ICT infrastructure fosters teachers' professional development in GTTC of Mbalmayo?

Significance Of Study

This study has great significance. First of all, the study findings provide knowledge and information on the impact of e-learning on education and academic performance of students. It will also provide knowledge and guidelines that may be of help to policymakers. The research is of importance to enhance students' academic performance in various academic disciplines. Application of ICT-based teaching and learning in an interactive manner stimulate students' interests to acquire knowledge and apply the acquired knowledge in solving practical life social and economic problems.

Higher levels of teacher self-efficacy beliefs are linked to greater teacher efforts and performances. Teacher self-efficacy for inclusion is a major contributor to successful inclusive practices and educational services for all students. Professional development is crucial in providing continual updates on effective teaching practices, tools and technology, and providing support in areas of need or interest. Professional development approached through a workshop style presentation has proven ineffective in meeting the needs of teachers. Massive amounts of information combined with little time for application and continued practice leave a great deal to be desired of traditional workshop professional development (Hunzicker, 2011). Effective professional development is

grounded in research-based practices, sustained over time, has collective faculty participation, and is content focused on curricular and teacher needs.

To the Scientific community

Experts involved in the field of education are increasingly engaged in the studies within their discipline which benefits the entire teachers' population and contributes to improvements and innovations in the entire educational system which lead to the attainment of goals set in from the meso to the micro levels. Research on program the implementation of e-learning in GTTCs programs, in the discipline of Citizenship Education which have an impact on the development of competencies on teachers' is designed to develop trustworthy evidence on program / curriculum implementation and the development of competencies within the Mbalmayo GTTC. This help in improving, directing, and bringing in innovations in GTTC programs in particular and the curriculum as a whole while increasing the rate of competencies developed by the teachers.

To the Government

It requires a careful formulation of objectives, establishment of priorities and identification to the means to achieve these objectives laid down by the state. It also helps in designing new educational systems, plan education and reform the educational system. Steinand Wolhuter (2010). This helps the state to be aware of the realities in the implementation process of GTTC programs especially in the rural areas of the country. With this, measures are taken to improve on it which also affects the development of competencies on the teachers' professional development.

To GTTCs education stakeholders

The achievement of students' is the interest of educational expects. This study brings out information that serves in reinforcing the strategy leading to development of competencies student-teachers'. It helps document accomplishment of program implementers. The school is an integral part in the implementation of programs and the development of competencies on students is very important as everyone who is involved

at every stage know what is required in the implementation process, which in turn is advantageous not only to the training center concerned but to the entire educational family. Administrators identify areas where there are lapses of inapplicability and improve on leadership styles that improve on students' performance with the use of ICT. It helps to assess individual achievement and satisfy accreditation requirements.

This study enables program implementers to dictate the causes of failures and successes on students in the development of competencies in GTTC of Mbalmayo. It assists to provide pedagogic animators, teachers with information on improvement on the implementation process of pedagogy during planning of lessons notes for the assimilation of the learner. Therefore, it revises implementation strategies and consequently the development of competencies on the students', achievement.

Students

Student-teachers benefit and see where improvement is made to increase their chances of succeeding and in developing competencies. This work enables future researchers in Science of Education and especially in program e-learning for the acquisition of knowledge. It serves as a referral manual for those inspiring to integrate ICTs in learning for student-teachers professional development.

Operational Definition of Terms

Learning

Learning occurs within an individual through the process of education, yet knowledge, skills, and attitudes are obtained through an interactive social interaction. According to Sfard (1998), learning consists of two metaphors, which are Acquisition and Participation. The acquisition metaphor means the process of knowledge acquisition by the individual learner, while the participation metaphor conveys that cognition and knowing are distributed over individuals and their environments. Learning comprises these two metaphors; yet, the emphasis of a social interaction. The social interaction characterises a community. Lave and Wenger (1991) use the term Situated learning to

explain that learning happens in context; in interaction with other community members. The idea of gaining value in education through becoming an element of a social group, however, had been conceptualised by Dewey (1938).

The process of learning in a community does not only enrich someone (Tu & Corry, 2002), but also solves problems and changes practice. McNeil (1997) explains that through the process of social learning over time, community members can build a common understanding and unique perspective on particular topics, knowledge, practices or approaches, which are useful to solve their problems and improve their practice together. This social learning process, as suggested by Bandura (1997), happens through the observation, mental states

E-Learning

E-Learning, distance learning or online learning: The process of using technology to deliver learning where the instructors and the students are not physically in the same place but rather use electronic means to deliver and participate in learning. This is a learning method whereby the learners and faculty members are at a distance, and it integrates "voice, video, networking and computer technologies" for its accomplishment (Sloan, 2017, p. 9). Networks such as satellite, wireless cable, and cable modems are known to link both the students and the instructors (Sloan, 2017).

Blended Learning

Blended Learning (BL) or Hybrid Distance Learning: Refers to a combination of the synergy brought by utilizing both traditional form of training, also known as classroom learning, and e-learning (Dziuban, Moskal, & Hartman, 2004). Blended learning is a way of integrating learning methods to enhance effective learning. This is accomplished by combining both classroom learning and e-learning. Equally, this is learning that has the classroom training as its hub. This can be explained using these examples: A new employee orientation process can be conducted in a class. However, the employees might be required to go home and complete the remaining part of the

process by sending their answers via electronic mail and electronic checklists (Wilson & Smilanich, 2015).

Instructional Technology

This is the use of various teaching tools not restricted to computer and computer software to improve learning. Technology describes all the tools that a student requires for effective learning. Some of these tools are calculators, CD players, cameras, and even projectors (Mills, 1987).

Interactive Video Conferencing (IVC) or Interactive Video Television (ITV)

This refers to a form of telecommunication technology that allows people at different locations to interact with each other. It is known for its use with audio in-person, presentation, white-board or smart-board and video transmissions concurrently. Interactive video conferencing serves a group of people but not an individual (Jerry, 2012).

Internet

This is an information system that covers the whole globe and is linked easily by use of the Internet Protocol (IP) or computers (Gayle, 2019). Computers connected over the Internet can send or receive any type of information: texts, videos or even computer programs (Radcliff, 2018).

Online Course

This refers to a course whereby both the instructor and the students can be at a distance, and all the materials needed are stored on the Websites. Online courses are known to utilize a course-management technology. The faculty members should determine the most appropriate time and place for their courses based on the courses' requirements (Kolby, 2006).

Teachers

The need for academic rigour and the infusion of research and evidence-based practice in the professional development of all teachers. Institutions continue to provide a range of courses and professional programs to support ongoing professional development for experienced teachers as do various professional associations and organizations. Sandholtz (2001) highlights the importance of "student-teachers partnerships" working in new ways to nurture ongoing teachers' professional learning. Miller (2001) describes partnership activities that serve schools by addressing areas of shared concern and interest such as New Teacher Induction Programs, joint publications, think tanks and seminars and production of shared resources such as instructional videos. Professional Development School sites, for example, are possibilities as school- partners work in new ways, such as teachers to design the collaborative teacher ed program, co-teaching courses, interdisciplinary team teaching, grant and proposal writing, making conference presentations, teacher research, and seminars. Sheerer (2000) points out that professional development practices need to emphasize mutual collaboration including partnership with schools. Collaborative professional development is premised on the plan that both school partners come together to "interpret research, inquire about practice and deliberate" on a variety of topics, including culturally sensitive practices.

Professional development

Professional development, opportunities for professionals to increase their knowledge and skills (Morgan, 2007). Professional development is understood and described in different ways. Joyce, Howey & Yarger (1976, p. 6) defined professional development as "formal and informal provisions for the improvement of educators as people, educated persons, and professionals, as well as in terms of the competence to carry out their assigned roles." Gall and Renchler (1985, p. 6) described professional development more specifically as "efforts to improve teachers' capacity to function as effective professionals by having them learn new knowledge, attitudes and skills." Fullan (2019, p. 265) defined professional development as "the sum total of formal and informal

learning pursued and experienced by the teacher in a compelling learning environment under conditions of complexity and dynamic change." Indeed, Fullan, Hill and Crevola (2018 p. 21) have begun to intentionally use "professional learning" to refer to the ongoing, focused "daily learning of teachers individually and collectively", finding professional development a "more narrow conceptual term." Day's (1999, p. 27) definition perhaps best highlights teachers' continuous professional learning within the broader context of change and its interconnected elements. According to Day,

> Professional development consists of all-natural learning experiences and those conscious and planned activities which are intended to be of direct or indirect benefit to the individual, group or school, which constitute, through these, to the quality of education in the classroom. It is the process by which, alone and with others, teachers review, renew and extend their commitment as change agents to the moral purposes of teaching; and by which they acquire and develop critically the knowledge, skills and emotional intelligence essential to good professional thinking, planning and practice with children, young people and colleagues throughout each phase of their teaching lives (p. 32).

Not surprisingly, professional development for teachers is often located in one or more paradigms. Generally, scholars criticize the "deficit" paradigm articulated by Gall and Renchler above that characterizes professional development as targeted to compensating for a lack in skills or knowledge and viewing teachers as empty vessels "to be filled" Garmston (2020, p. 64). Some locate it within a "professional growth" paradigm that characterizes development as more self-directed arising from the learner's interests and needs (Feiman-Nemser, 2001). Some locate it within an "educational change" paradigm which views development as focused upon bringing about change (Fullan et al., 2018; Warren-Little, 2001). Still others position professional development within a "problem solving" paradigm which links development to making improvements to address identified issues like student achievement needs (Joyce & Showers, 2016). Guskey (1994, p. 63) emphasizes and connects the growth and problem-solving notions

of professional development, suggesting it is "increasingly seen as a process, not an event, …that the process in intentional…and is a systematic effort to bring about positive change or improvement." Many other researchers call for a similarly integrative view of professional development (Day, Elliot & Kingston, 2015; Lieberman & Miller, 2000, 2001).

Professional development for experienced teachers is most often discussed in the literature as a segment or phase within a career long or continuing professional development (CPD) process. Within the continuum of teacher development, professional development for experienced teachers includes different components and takes many forms. Fullan et al., (2018) claim, for example, that professional learning that focuses on contextually-based, personalized, data-driven instruction is one of the three central components of Breakthrough thinking that will be critical to successful educational reform and that will noticeably improve and sustain learning for students and teachers alike. In their view, teachers must be learning in their classrooms every day. Coherence is a critical feature of successful professional development approaches. Goals and standards, processes and practices, and assessment approaches of professional development need to have transparent, meaningful, and manageable standards and demonstrable outcomes that align and are integrated with student learning, organizational and societal learning needs and purposes.

Underpinning and shaping any particular learning process is ongoing consideration of multiple and interconnected factors including: student and teacher learning and performance; the learning context; the realities of the day-to-day work of teachers; research and knowledge bases that inform the act of teaching; teacher's interests and level of development; independent and collaborative learning activities and processes that are responsive to teachers' different ways and levels of learning and knowing; accountability and ways of assessing professional growth; meaningful, and manageable standards for teachers; alignment among personal, school and system goals; and attention to broader change processes.

Delimitation of the Study

Despite the strengths of this survey, some delimitation should be highlighted. While a cross-sectional study may provide an understanding of the type of e-learning and student-teachers professional development that occurs in schools, it is not able to establish a causal relationship, as it does not make any observations over time. Furthermore, convenience sampling was performed to collect responses in the easiest way for the researcher, which limits the ability to generalize the results. Based on the convenience sample and the respondents, the research was somewhat limited GTTC of Mbalmayo which influenced the results of this study. Other limitations may have influenced the relationship between e-learning and student-teacher professional development that cannot be captured by the data. Since this study focuses on integrating e-learning to professional development. There may also be unforeseen factors that impact the relationship, such as financial changes and budget cuts.

Chapter Summary

This chapter has examined the conceptual, historical, theoretical background, contextual research problem, research questions, objectives, and hypotheses, significance of the study and the definition of some key terms. Showing how advances in technology and the growth of population increases the importance of collective action in schools. Individual is always crucial and affecting the dynamic of a group in organization and the dynamics of environment. Institution has to develop products, policies, procedures, and processes that deliver products and services to its population in an efficient and effective manner. The chapter also shows how technology has accelerated the pace of change in teaching. Chapter 2 outlines the historical context and purpose of e-learning before discussing various methods of professional development design. Additionally, it describes the link between e-learning and student-teachers professional development. Chapter 3 then presents the research design and methodology and explains the independent, dependent, and control variables. Subsequently, Chapter 4 analyzes the

results of the study in order to address the research questions. Chapter 5 concludes with the findings and implications of the study as well as recommendations for future research.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviews the existing literature on e-learning and student-teachers professional development within GTTC. The following theories are discussed in this chapter. The Constructivism Theory – Jean Piaget (1972) and Jerome Bruner (1990) Facilitation Theory (The Humanist Approach) – Carl Rogers (1980) and other main concepts are discussed as well.

It begins with a history of professional development with a focus on how politics have shaped professional development and student academic performance. Then, it considers the purpose of professional development, its connection to student academic performance, and how professional development is designed before analyzing the most frequently researched methods of professional development. Finally, the chapter reviews the literature to identify stakeholders who are involved in planning professional development as well as barriers to implementation.

Conceptual Background

E-learning

E-Learning is based on investing in the opportunities already available in learning environments in order to enrich the learning process and achieve a quality education. Although E-learning has various advantages in the field of education, the failure percentage when implemented is still relatively high, and is something which is an increasing concern for educational institutions.

E-learning, also known as distance learning or online learning, refers to a system of imparting knowledge through teaching from a distance where technology is used. In most cases, the student is physically absent from the classroom but through technology, virtually interacts with the instructors and tutors (Warschauer, 1997). Generally speaking, e-learning provides access to learning in situations where both the source of information

and the recipient, usually the student, are separated by time, distance, or both (Cooke, Crawaford & Warner, 2009).

E-learning came to light thanks to advancements in technology that produced PC, CDs, and the Internet. Several organizations in and out of government have employed e-learning with various degrees of success to impart new skills and knowledge to their workforce and make other relevant parties aware of what transpires within the organization (Cooke et al., 2009).

According to Bannan-Ritland (2002), it is worth noting that the incorporation of such technological innovation in education was necessitated by the desire to counter the effect of geographic distance hindering knowledge acquisition, to provide convenience, to overcome the problem of inadequacy of resources, to diminish overpopulated educational institutions, and to augment traditional teaching methods, among others (Coventry, 2002).

Historically, the concept was assumed to date back to 1728, when an advertisement in the Boston Gazette showed a shorthand teacher was looking for students to take lessons on a weekly basis (Garrison, 1990). The postal service was the tool used to carry out the initiative throughout the 19th century.

E-learning describes using ICT towards improving learning within educational training. Nevertheless, e-learning involves use and application of a variety of tools and techniques, for instance e-mails, websites, blogs, social and business media, and being able to access program supplies on the internet whilst carrying out programs delivered entirely on the internet (Heeger, 2010). Although e-learning platforms can be of different kinds, some advanced private secondary schools in shomolu provide educational programs that involve use of web or the internet systems to improve students' academic achievements.

According to Olaniyi (2006), e-learning is all about learning that occurs at the computer. In our contemporary world, the learning through the aid of a computer simply

means online knowledge acquisition through the internet or offline through Compact Disc Read-Only Memory (CD-ROM). In other words, it is the use of network technologies to create, foster, deliver, and facilitate learning, anytime and anywhere. Horton (2005) defined e-learning as the use of internet and digital technologies to create experiences that educate our fellow human beings. E-learning has the potential to revolutionise the way we teach and how we learn (DfES, 2003).

Computer skills and availability of Computer infrastructure

Computer skills and availability of computer infrastructure in school that influence learning. Prior computer skills are thought to make it easy for students to use computers and computer software that are used to deliver academics. Also, the availability of computer infrastructure available in the secondary school promotes the performance as adequate access is granted for practice. Academic performance is the dependent variable in this study, how does academic performance vary based on the independent variables. Attitude which deals with the overall perception of the learner about learning style and hence influencing performance is the intervening variable. Regardless of the variance of the independent variables, the intervening variable's influence is constant. Teacher – student relationship is the moderating variable that provides the interaction effect where it moderates the relations between the independent variables. Academic performance in an e-learning setup can be influenced by varied variables either positively or negatively.

Academic achievement has to do with what a learner is able to accomplish by execution of class work in the school. Olomo (2001) sees academic achievement as something a learner do or achieve at school, college or university, in class, in a laboratory or field work. Some of the purposes of academic achievement measurement are enumerated as follows: to determine the relative effectiveness of a program in terms of teachers' behavioral outputs; to identify teachers' growth or lack of growth in acquiring desirable knowledge skills; to encourage teachers to develop a sense of discipline and systematic study habits.

According to Adomi and Kpangban,(2010) the new partnership for African Development (NEPAD) launched e-schools initiative, intended to equip all African schools with ICT facilities, including computers, radio and television sets, phones and fax machines, scanners, digital cameras and copiers among others and to connect the students to the internet. He stated that the aim of the initiative was to impart ICT skills to young Africans in schools and noted that although efforts have been made to ensure that ICTs are available and used in Nigeria schools, the level of uptake is still low.

Philip, Oluwagbemi and Oluwaranti (2010) observed that tertiary institutions in the lack adequate ICT infrastructure to effectively tap into the opportunities offered by the cyberspace. They stated that personal computers are available in most institutions, but they are not readily accessible to teachers because of the low computer to teachers' ratio, put at about 1 to 40. In addition, the basic software needed for practical works are not available and where they are available, they are not accessible because of the low ratio. It was remarked that for internet connectivity in most institutions, the bandwidth subscribed is too small to support any meaningful activity during peak period. They also noted that, where ICT infrastructures like multimedia projectors are available, other infrastructures like interactive whiteboards are lacking.

Anunobi and Edoka (2010) examined the use of ICT facilities and discovered that personal computer, photocopiers and CD-Rom were the ICT facilities mostly used in serial units. Other facilities identified were printers, local area network (LAN), scanner, fax machine and the internet. It was identified that none of the libraries used E-mail or wide area network (WAN) facilities in the serial's unit. But noted, however, that many serials operations are performed with ICT facilities outside the serial's units.

Osofisan and Osunade (2007) evaluated the ICT services available in educational and research institutes. It was observed that, in most of the educational and research institutes surveyed, ICT infrastructure had just been put in place. Although, there were computer systems available for many years, but their use was limited to only word processing. The authors stated that the drive in most of the institutions was on internet

service. The study revealed equipment and services available in the institutes to include printers, scanners, LAN, E-mail, the internet, websites, intranet, telephone. It was found that there was no WAN connectivity between any two educational or research institutes. The study also revealed that not all the institutes had websites, and those who had did not update them regularly and the content present on most of the websites were not useful to researchers.

Akomolafe (2009) investigated the strategies and challenges of ICT infrastructure development for in education in Nigeria. He stated that available infrastructure for ICT in most institutions were grossly inadequate. He identified that most students still visit the internet off campus because of too much demand on the internet on-campus. Respondents indicated that computers available for internet browsing were inadequate to meet the demand for its usage. He observed that much attention was given to computers and the internet while other ICT infrastructures such as CD-ROM, radio, tape, television, mobile phones and others were lacking and that the level of awareness on the extent to which ICT could be useful in education was still low, noting that many lecturers were not conversant with ICT usage in classroom situations.

Kumah and Tanye (2009) sought the views of tertiary institution students on ICT usage in Ghana. He stated that Ghana's public universities' ICT growth was lagging in comparison to the country's business usage. It is worth noting here that the use of ICTs, such as the interactive whiteboards, was increasing in a number of lecture halls. Email was used by most students, but it was limited to their personal communication with friends and family members. It was stated that most lecturers do not engage their students in the use of ICT for academic purposes.

Cheah and Wong (2007) examined the key aspects of ICT infrastructure in three selected universities in Singapore. And discovered among others that,

- The university were linked up and fully networked within the campus using wired and wireless LAN. All computers in the universities are networked and the

campus-wide network extends to halls of residence, graduate housing, laboratories, libraries, tutorial rooms, staff offices etc.

- All the campuses have internet access with improved bandwidth.
- E-mail accounts were provided to their students for communications amongst staff and students.
- Each faculty staff or administration staffs is provided a computer.
- Many computer laboratories were provided within the campus with the computers normally equipped with specialized software for teaching and learning purposes.
- Every tutorial room and lecture theatre was equipped with proper audiovisual facilities, a computer connected to the internet, a projection system, videoconferencing facility used to connect to international organizations for collaboration, research and meetings.

No study found in literature covered the general area of ICT facilities and their associated services/resources. There were also no efforts to determine the exact extent to which these facilities, services or resources are applied in institutions. The present study therefore seeks to fill these gaps located in literature, and possibly broaden the views on ICT.

Types of E-Learning

There are diverse ways of classifying the types of e-learning. According to Algahtani (2011), there have been some classifications based on the extent of their engagement in education. Some classifications are also based on the timing of interaction. Algahtani (2011) divided e-learning into two basic types, consisting of computer-based and the internet based e-learning.

According to Algahtani (2011), the computer-based learning comprises the use of a full range of hardware and software generally that are available for the use of Information and Communication Technology and also each component can be used in either of two ways: computer managed instruction and computer-assisted-learning. In computer assisted- learning, to him, computers are used instead of the traditional methods

by providing interactive software as a support tool within the class or as a tool for self-learning outside the class. In the computer-managed instruction, however, computers are employed for the purpose of storing and retrieving information to aid in the management of education.

According to Almosa (2002) is a further improvement of the computer-based learning, and it makes the content available on the internet, with the readiness of links to related knowledge sources, for examples e-mail services and references which could be used by learners at any time and place as well as the availability or absence of teachers or instructors (Almosa, 2002). Zeitoun (2008) classified this by the extent of such features use in education, mixed or blended more, assistant mode, and completely online mode. The assistant mode supplements the traditional method as needed. Mixed or blended mode offers a short-term degree for a partly traditional method. The completely online mode, which is the most complete improvement, involves the exclusive use of the network for learning (Zeitoun, 2008).

Algahtani (2011) described the completely online mode as “synchronous” or “asynchronous” by the application of applying optional timing of interaction. The synchronous timing comprises alternate on-line access between teachers or instructors and learners, or between leaners, and the asynchronous, to him allows all participants to post communications to any other participant over the internet (Algahtani, 2011; Almosa and Almubarak, 2005). The synchronous type allows learners to discuss with the instructors and also among themselves via the internet at the same time with the use of tools such as the videoconference and chat rooms. This type according to Almosa and Almubarak (2005) offers the advantage of instantaneous feedback. The asynchronous mode also allows learners to discuss with the instructors or teachers as well as among themselves over the internet at different times. It is therefore not interaction at the same moment but later, with the use of tools such as thread discussion and emails (Almosa and Almubarak, 2005; Algahtani, 2011), with an advantage that learners are able to learn at a time that suits them whilst a disadvantage is that the learners will not be able to receive

instant feedback from instructors as well as their colleague learners (Almosa and Almubarak, 2005).

According to Abimbade (2002) educational technology vis-à-vis instructional technology whether as a field of education or new terminology to what has been there before like teaching aids or apparatus, as it was earlier called but recent achievements in the field of computer and communication technologies have offered tremendous opportunities for learning by electronic means (Rozina, 2002). Therefore, the world of technology continued to grow and today the whole world has become a global village. By the beginning of the 21st millennium educational technology has stretched educational boundaries and created new ones on a daily basis. One of these new and rapidly expanding boundaries is e-learning which is offering tremendous advantage to education sector (Abimbade, 2002).

Following Oye, Salleh and Iahad (2011), e-learning is basically a teaching and learning method via the web, system or a standalone personal computer (PC). From another dimension, Cooke (2014) defines e-learning as a network-enabled expression associated with functions that facilitate teaching and learning in an efficient manner.

E-learning programs and procedures consist of web-based learning, computer-based learning, digital classes and electronic activity (Heeger, 2010). The programs provide platforms with content materials which are transferred by the web intranet or extranet, sound or even movie MP3s, satellite televisions and CD-ROMs. It is against this background that e-learning was initially known as “internet-based learning”, while nowadays, e-learning is called “web-based learning”. Technically, e-learning does not only regard instructions and coaching by the instructor, but also involves learning that is tailored made to specific learner needs in the private secondary school. According to Oye, Salleh and Iahad (2011), numerous terminologies occur to be accustomed to determine learning which are on the internet. For that reason, e-learning and learning online are regarded to have different meanings (Cooke, 2014).

Given that the success of e-learning in enhancing students' academic achievement depends on the quality of ICT, the impact of e-learning on student academic achievement cannot be isolated from the nature ICT infrastructure (Niyazazari & Hosseini, 2012). In today's highly globalized world, the use and application of ICT in teaching for learning has brought about remarkable achievement in improving students' academic performance in many academic disciplines.

According to Mahdinejad and Amoii (2011), application of ICT-based teaching and learning in an interactive manner stimulates students' interests to acquire knowledge and apply the acquired knowledge in solving practical life social and economic problems. The use of ICT which comprises of desktop and personal computers, laptops, the internet, and multimedia, enhances capacity to accomplish tasks faster with speed and accuracy in teaching and learning. These features change the role of the teacher and the learner, facilitate learning, and lead to interactive learning, learner autonomy, self-sufficiency, and self-confidence (Zameni & Kardan, 2012). By integrating content and information literacy, often in textual and visual forms, ICT produces significant learning and academic achievement. In other words, incorporation of ICT into the area of education has changed the role of teachers from a mere source of educational material to supervision of learning process. This increases self-sufficiency and self-confidence in students' learning processes (Zameni & Kardan, 2012).

The knowledge of ICT today is being emphasized as the effective vehicle for teaching and learning (Zameni & Karan, 2011). With the widespread use of the internet, knowledge has become more effectively reachable by the mass population of students. The use of ICT promotes effective engagement of the learners, enhancement of learning, ease the use of teaching methods and materials to respond to students' interests and needs; empowerment of the learners to control the learning schedule, and the pace of execution of the learning program; enables interactions between learners and materials, and learners and teachers by the usage of animation, image and sound together in the learning process; abstract concepts that are difficult to understand can be solid and easy to learn by

eliminating the limitations of conventional method of teaching and the constraints of time and space (Qaznavi, 2010).

Shekari (2010) further finds relatively low usage of ICT facilities (46%) in teaching and learning processes in schools as both teachers and students are constrained by inadequate ICT facilities to advance teaching and learning. This implies that teachers and students have limited opportunities and capability in using ICT facilities to expand their knowledge and skills in curriculum instruction. Consequently, the quality of education being given to learners is inadequate and reflect in low outcome. The major constraints perceived by teachers against effective utilization of ICT facilities for teaching-learning process in schools include inadequate supply of computer hardware and software; irregular power supply; limited training opportunities for teachers; low level of institutional partnership with professional and corporate bodies for technical support; poor funding and maintenance (Shekari, 2010). The challenges identified are inimical to effective teaching and learning processes; consequently, majority of the learners lack the knowledge of ICT in colleges. Adequate provision of ICT facilities and better management of available ICT facilities were identified as means to improve ICT facilities utilization in tertiary colleges in order to enhance students' academic performance (Mahdinejad & Amoii, 2011).

Using e-Learning in Education

The development of multimedia and information technologies, as well as the use internet as a new technique of teaching, has made radical changes in the traditional process of teaching (Wang et al. 2007). Development in information technology, According to Yang and Arjomand (1999), has generated more choices for today's education. Agendas of educational institutions have recognized e-Learning as having the prospect to transform people, knowledge, skills and performance (Henry, 2001). Also according to Love and Fry (2006), colleges, universities, and other institutions of higher learning race to advance online course capability in a speedily developing cyber education market. E-learning, has come to be more and more important in institutions.

The introduction and expansion of a range of e-Learning tools has been initiating several changes in higher education institutions, particularly when it comes to their educational delivery and support processes (Dublin, 2003).

Just as there are different types of e- Learning, there are also different ways of employing the technique in education. Algahtani, (2011), in his evaluation of E-learning effectiveness and experience in Saudi Arabia, discovered three distinct models of using e-learning in education including the "adjunct, blended e-learning and online". The three ways of using e-Learning technologies as discovered by Algahtani (2011) are described below. The "adjunct e-Learning is the situation which e-Learning is employed as an assistant in the traditional classroom providing relative independence to the learners or students (Algahtani, 2011). In the blended e-Learning, Algahtani (2011) and Zeitoun (2008) explained that, in this way of using e-Learning, the delivery of course materials and explanations is shared between traditional learning method and e-learning method in the classroom setting. The third one which is the online is devoid of the traditional learning participation or classroom participation. In this form of usage, the eLearning is total so that there is maximum independence of the learners or students (Algahtani, 2011; Zeitoun, 2008). Zeitoun (2008) has gone further to explain that the online model is divided into the individual and collaborative learning, where the collaborative learning also consist of the synchronous and asynchronous learning (Zeitoun, 2008).

E-learning is multidimensional and dynamic, and changes according to context, circumstances and interests. As a matter of fact, it is difficult to define the term 'e-learning'. Perkinson (2005, p. 104) defines e-learning as "instructional content or learning experiences delivered or enabled by electronic technology". According to Commonwealth of Learning (2006), e-learning and online learning are terms that have emerged to describe the application of ICTs to enhance distance education, implement open-learning policies, make learning activities more flexible and enable such learning activities to be distributed among many learning venues. On his part Naidu (2003, p. 8) defines e-learning as "the systematic use of networked information and communication

technology in teaching and learning". Thus e-learning is an all-encompassing term which includes computer-enhanced learning, the use of mobile technologies such as Personal Digital Assistants (PDAs) and MP3 players to facilitate learning. As far as this work is concerned, e-learning is a modern strategy or method of teaching and learning which involves Computer-Based Direct Instruction (CBDI) – direct instructions for example, lectures, demonstrations and illustrations facilitated or enhanced by ICTs; Asynchronous Experiential Learning (AEL), experiential learning enhanced by the internet and its facilities; Asynchronous Collaborative Learning (ACL), cooperative or interactive strategy (discussion method) enhanced or facilitated by the internet and its facilities;. Internet Based Problem Solving (IBPS), a problem-solving method improved by the internet and its facilities; Online Content Representation; (OCR), the diverse representation and presentation of information on the internet (text, audio, video, audio visual, graphic, picture format) and Online Learning Environments (OLE) – the flexibility, limitless storage, user-friendly, accessibility features or characteristics of an online platform. Electronic applications and processes involved include the internet, handheld devices (personal digital assistance, simple mobile phones, smart phones, and tablets), television and digital radio.

Importance of Professional Development

Professional development opportunities are essential in every profession to increase efficiency and the ability to compete in a global economy (Walker, 2010). The teaching profession is not beyond the need for improvement. Legislation has laid the groundwork for improvement by requiring educators to receive professional development as student teachers and in service teachers. A professional development activity has the responsibility of addressing the needs of teachers and students through meeting legal requirements, expanding content knowledge, developing curriculum, and encouraging best practices for instructional and managerial strategies within the classroom. High quality teachers provide excellent educational opportunities that yield students who are successful learners (Kaplan & Owings, 2004).

Vogel (2006) suggested that quality professional development for educators has a greater impact on student achievement in comparison to higher teacher salaries and smaller teacher-to-student ratios. The purpose behind effective professional development is to positively impact behaviors of teachers and in turn, have a greater impact on learning and student achievement (Darling-Hammond & Richardson, 2009; Jakes, 2008; Walker, 2010; Wenglinsky & Silverstein, 2006). An administrator will wisely invest in the development of educators to bring about change and increase the quality of education and learning (Kaplan & Owings, 2004; Linn, Gill, Sherman, Vaughn, & Mixon, 2010). Donaldson (2010) suggested a rigorous teacher evaluation system that provided feedback and was linked to professional development in order to increase effective educational practices. Learning Forward recommends school districts spend approximately 10% of their annual budget on professional development (Vogel, 2006). Increasing financial support for professional development accompanied by employing quality programs and activities will strengthen reform efforts (Braden et al., 2005; Dede, Ketehut, Whitehouse, & Breit, 2008).

Causton-Theoharis and Theoharis (2008) documented how student learning improved after policies, procedures, curriculum, and instruction were shifted to support all learners. The noted challenge for teacher professional development is to provide the opportunity for teachers to deepen their understanding of the learning process and continuously develop instructional approaches that support learning (Walker, 2010). Student success is largely dependent upon the teacher's ability to instruct every student, collaborate with fellow educators, and continue to develop and build his or her own abilities, skills, and knowledge. There is a great need for continuous professional development that supports both general education and special education teachers, especially relating to effective instruction and inclusive practices that will have a positive impact on teachers' self-efficacies for inclusion (Schlauch, 2003; Worrell, 2008).

Sallee (2010) reported a direct correlation between professional development activities and teaching practices by describing activities of schools reaching distinguished

status. Those schools that were distinguished held professional development activities that included an analysis of instructional practices, used data, emphasized collaboration, used similar instructional strategies, and allowed for evaluations of the activities by participants. "Schools and districts should challenge each teacher to develop, apply, and reassess beliefs and knowledge gained in professional development in the content of their own classrooms so that attitudes, knowledge, and practice are truly integrated" (Weiner, 2003, p. 18). This is echoed in Bandura's description of the development of self-efficacy through mastery and vicarious experiences (Bandura, 1997).

Preparing educators for every situation that may occur during their tenure is impossible for teacher training programs. Professional development is crucial for educators to continue increasing their knowledge and instructional skills based on their current needs, the needs of their students, and best-practice research. The practice of educating all students through the practice of inclusion has slowly taken place through restructuring of policies, procedures, curriculum, and instruction in the general education classroom. Educator support and guidance to reach this reformation is necessary through implementation of effective professional development programs and plans.

Effective Professional Development

Educational success is when students learn and continue to develop skills, knowledge, and love of learning throughout their lifetime. "Research confirms that teacher and teaching quality are the most powerful predictors of student success. The more years that students work with effective teachers, the higher their measured achievement" (Kaplan & Owings, 2004, p. 1). Effective training and professional development of teachers are vital to the strengthening of the public education system. Traditional approaches to teacher development have proven ineffective and teacher education simply is unable to prepare teachers for every challenge they may face throughout their career (Schleicher, 2011).

For decades, professional development was approached through presentation style workshops that left little room for teachers to apply new information to their instruction while receiving ongoing support for those changes to take effect. Professional development workshops have minimal effects on participants and students (McLeskey & Waldron, 2002b; Rebora, 2008). Hunzicker (2011) relates the ineffectiveness of workshops to the great amount of information disseminated during the presentation with little time for real classroom application. The lack of desired results from traditional professional development workshop attendance stems from transferability of unfocused content, lack of intensity, and lack of continual uniformity found to produce changes in behavior (Braden et al., 2005; Choy, Chen, & Bugarin, 2006; Linn et al., 2010). These vicarious experiences are influential in building self-efficacy. Mastery experience is maintained as the most beneficial avenue to impacting self-efficacy (Bandura, 1997).

The history and deliverance of professional development has not met the needs of teachers (Schleicher, 2011). In 2007-2008 the Organization for Economic Co-operation and Development conducted the Teaching and Learning International Survey. In this study 23 countries and 2 million teachers were represented. Participating teachers indicated they still had unmet needs in being prepared to instruct heterogeneous learning groups and other challenges they face (Schleicher, 2011). Finding new tools in teacher training is a necessity for the improvement and effectiveness of public education. There is a move away from traditional professional development workshops, where the style is presentation centered and focused on providing a vicarious experience, to a more interactive approach. "The most useful professional development emphasizes active teaching, assessment, observation, and reflection rather than abstract discussions" (Darling-Hammond, 2006, p. 46). Studies suggest that effective professional development efforts are guided by research, occur throughout the calendar year, are collaborative, and center active participation around instruction within the context of the learning (Holmes, Singer, & MacLeod, 2011).

Effective professional development occurs when there is collective participation; content is focused on curriculum needs and research-based practices; connected to system and school wide goals; extended over a period of time to allow for active learning and practice; follow- up activities include coaching, with feedback opportunities and additional development activities (Lyndon & King 2009; Snow-Renner & Lauer, 2005). These characteristics are found in the mastery experiences known to positively impact self-efficacy (Bandura, 1997). In contrast to the traditional one-day workshop, professional development activities that are sustained over time are more likely to impact teacher behavior and allow for implementation of current teacher and student needs (Garet et al., 2001).

Educational leadership is approaching the planning, design, and provision of teacher professional development through strategic implementation of educational reform strategies. Administrators are informing themselves on the needs of staff through revision of data and teacher input. Research supports schools and school districts including classroom teachers in the planning of professional development by allowing them to identify their needs and work with colleagues to meet goals (Chauvin & Eleser, 1998; Jenkins & Yoshimura, 2010; McLeskey & Waldron, 2002b; Nieto, 2009).

The need for continuous professional development hinges on the constant review of student data and changes in teacher self-efficacy that were not obvious before. McLeskey and Waldron (2002a) state, “the most effective strategy to ensure continued improvement is to provide ongoing professional development” (p. 169). Wiliam (2007) addressed the concept of formative assessment. He suggested that student learning had the ability of increasing at a fast pace if this type of reform strategy is implemented beyond benchmark data and is a supplement to further shape instruction and needed professional development. Monitoring student and teacher data will provide links between professional development, implementation, teacher capability, continual development of teacher self-efficacy, and student success (Casale, 2011).

Stephenson, Carter, and Arthur-Kelly (2011) discussed implementing six principles of professional development to sustain new teaching practices: practical and concrete practice, clear guidelines, realistic degree of change, feedback on performance, collaboration with researchers on data, and mutual support available for teachers. Increasing time spent on professional development does not by itself increase the quality of training (Guskey, 2009). Effective professional development must be well organized and structured to meet the needs of the district, while conveying the purpose of the development to the participants (Casale, 2011; Guskey, 2009). The content and types of activities that occur during teacher development are influential in developing teacher knowledge and instructional skills. Reform activities and increased contact hours have had a positive influence on teacher skills. Mastery and vicarious experiences or, "handson work that enhanced teachers' knowledge of the context and how to teach it produced a sense of efficacy – especially when that content was aligned with local curriculum and policies" (Darling-Hammond & Richardson, 2009, p. 47).

The most effective predictor of educational success is the teacher and the quality of instruction provided (Kaplan & Owings, 2004). Traditional workshop style approaches to professional development of educators have proven ineffective (Schleicher, 2011). Workshop methods disseminate a great deal of information in a short time span, allowing for little, if any, real time application (Braden et al., 2005; Choy et al., 2006; Linn et al., 2010). Research is guiding professional development to emphasize active participation, review and use of student and teacher data, and time for reflection and evaluation (Holmes et al., 2011). These characteristics are important in their contribution to effective change in teacher instruction and require additional resources of time and money. Administrators need to understand the importance of teacher input in planning development opportunities in addition to understanding and creatively tackling barriers to professional development (Chauvin & Eleser, 1998; Jenkins & Yoshimura, 2010; McLeskey & Waldron, 2002b; Nieto, 2009).

Learning forward relied on a professional support system of 40 professional educational associations and organizations to develop and update the seven standards that are: learning communities, leadership, resources, data, learning designs, implementation, and outcomes (Learning Forward, 2011). Hirsch (2009) described exercises for professional educators to strengthen their instruction:

> Good teaching occurs when educators on teams are involved in a cycle in which they analyze data, determine student and adult learning goals based on that analysis, design joint lessons that use evidence-based strategies, have access to coaches for support in improving their classroom instruction, and then assess how their learning and teamwork affects student achievement. (Hirsch, 2009, p. 10)

Learning Forward alongside their professional support system has taken the last decade of research on best practices to continue to provide guidance in professional learning.

E-Learning on Academic Performance

Attitudes concerning e-learning, echoed by scholarly and academic reviews, range from neutral to positive. On one hand, it is noted that e-learning is at least as effective as traditional instructional strategies (Rosenberg, Grad and Matear, 2003), and that there are no major differences in academic performance between the more traditional and more technology-oriented modes of instruction (Cavanaugh, 2001). On the other hand, many reviews go further, reflecting a principally positive attitude towards the impact of e-learning (Olubamise, 2003). The current piece sought to demystify e-learning by concentrating on how specific e-learning factors (socio-demographic characteristics and prior computer skills) influence individual academic performance.

There is a considerable body of evidence to suggest that different teaching delivery styles can have different degrees of success; as measured in terms of academic results (Emerson and Taylor, 2004). In relation to online teaching, some studies indicate that this medium of delivery has a positive impact on performance. Other studies

however, find that greater online teaching has a negative impact on performance (Johnson, 2005).

Benefits include offering a variety of new possibilities to learners (Breuleux, Laferrière, and Lamon, 2002), in addition to having a positive effect on students' achievement in different subject matter areas (Chambers, 2003). Other benefits of electronic education include increases in enrollment or time in school as education programs reach underserved regions, broader educational opportunity for students who are unable to attend traditional schools, access to computer resources and instructors not locally available, and increases in student-teacher communication. According to Barker and Wendel (2001) students in virtual schools showed greater improvement than their conventional school counterparts in critical thinking, researching, using computers, learning independently, problem-solving, creative thinking, decision-making, and time management. A study by Calderoni (1998) revealed that academic advantages over traditional classroom instruction were demonstrated by students in Mexico's Telesecundaria program, who were "substantially more likely than other groups to pass a final 9th grade examination" administered by the state; by students taking a chemistry by satellite course (Dees, 1994); and by students learning reading and math via interactive radio instruction (Yasin and Luberisse, 1998).

Electronic education is not the most effective choice in all situations. Virtual school students show less improvement than those in conventional schools in listening and speaking skills (Barker and Wendel, 2001). Highly technical subjects have also proven to be difficult to teach well online. The Alberta Online Consortium evaluated student performance on end-of-year exams among virtual school students across the province, and found that virtual school student scores in mathematics, and the sciences lagged significantly behind scores of non-virtual school students (Schollie, 2001).

Kearsley (2000) notes that given instruction of equal quality, groups of students learning online generally achieve at levels equal to their peers in classrooms. Equality between the delivery systems has been well documented over decades for adult learners.

Evidence to date convincingly demonstrates that when used appropriately, electronically delivered education,'e-learning improves how students learn, can improve what students learn, and can deliver high-quality learning opportunities to all children" (NASBE, 2001).

Benefits of ICT in Education

The uses of ICT are making major differences in the learning of students and teaching approaches. Schools in the Western World invested a lot for ICT infrastructures over the last 20 years, and students use computers more often and for a much larger range of applications (Yusuf, 2005). Several studies reveal those students using ICT facilities mostly show higher learning gains than those who do not use. Furthermore, the use of ICTs in education also shifts the learning approaches. As put by (Bransford, Brown, and Cocking, 2000) cited in Yusuf (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 (Yusuf, 2005).

ICTs are exerting impacts on pedagogical approaches in the classrooms. Their contribution to changes in teaching practices, school innovation, and community services is considerable. A research review by Nworgu (2005) suggests three significant concerns of consideration regarding ICTs impact on education. Firstly, student out comes such as higher scores in school subjects or the learning of entirely new skills needed for a developing economy. Secondly, we should consider teacher and classroom outcomes such as development of teachers' technology skills and knowledge of new pedagogic approaches as well as improved attitudes toward teaching. Finally, one has to consider other outcomes such as increased innovativeness in schools and access of community members to adult education and literacy. The table below presents comparison of the traditional pedagogy and the emerging pedagogy of constructivism that fits to the use of ICT (particularly the computer and internet) to increase student involvement in learning.

Emerging pedagogy is the name given to the new view of constructivist learning when compared to the relatively long existing behaviourist view of learning.

Benefits of e-Learning

According to Abrani (1996), the adoption of e-learning has been hailed for the numerous advantages that it brings. For instance, it expands access to education and training, and the whole concept helps meet the demand for knowledge acquisition despite distances and differences in individual schedules. Additionally, it helps address the problem of inadequate classroom space and other facilities.

It is important to cover briefly the major benefits of e-learning in order to provide a context aimed at explaining why e-learning is crucial for the development of the learning process and the reasons why e-learning provides more efficient learning environments compared with the traditional learning experience. e-learning is rapidly growing as an acceptable way of education. Remarkable progress has been made in e-learning over the last few decades. ELearning provides a wealth of benefits which serve the main educational stakeholders in the learning environment, namely students and teachers (Al-Harbi, 2010; Bhuasiri, Xaymoungkhoun, Zo, Rho, and Ciganek 2012; Alkharang and Ghinea, 2013; Al-Marabeh and Mohammad, 2013). These include an increased accessibility to information, better content delivery, personalized instruction, content standardization, accountability, on-demand availability, self-pacing, interactivity, confidence, and increased convenience. E-learning reduces costs, enables a consistent delivery of content, and improves tracking. The benefits of e-learning can be summarized in three advantages as follows:

- **Delivering Effective Learning**

E-learning has the potential to create successful and meaningful learning environments that motivate the learners and offer powerful tools for interaction and communication. Al-Harbi, (2010) argues that in an e-learning course, using stimulations created by software, such as Flash and Shockwave can support the cognitive work of

analyzing data, manipulating models and exploring ideas and concepts (Khan, 2005). In addition, using multimedia enrichment resources develops the learners' understanding and enriches their educational experiences (AlHarbi, 2010). E-Learning also creates an opportunity for learners to learn according to their individual learning styles and preferred cognitive style, be it visual, audio or text oriented, and allows learners to arrange the content and knowledge for their own needs and learning styles, and to improve the quality of learning experience and support learning by offering differentiated learning (Jethro, Grace and Thomas, 2012). The learner must be responsible for actively seeking solutions to problems contained within the course framework and through knowledge generation as students generate and construct their own knowledge in line with the guidance and help them receive from the instructor.

- **Enabling Interaction and Communication**

E-Learning has the potential to enhance the traditional communication patterns between students and teachers and students themselves by creating a new learning environment. Mahdizadeh, Biemans and Mulder (2008) specified that the relationship between teachers and students is no longer a one-way relationship, but rather it is about creating more collaboration and interaction between students to increase their participation and involvement in the classroom. E-Learning can be more flexible and often involves technologies such as audio-chatting, video conferencing and online discussion, which provide learners the opportunity to interact with teachers and others students effectively and flexibly. The literature highlights that the role of teachers and students is changing under the impact of the new learning environment (McGhee and Kozma, 2003). These changes have repercussions on the roles of both teachers as well as students. McGhee and Kozma, (2003) and Dargham, Saeed and Mcheik (2012) suggested that students play a vital role in collaborative learning environments as they participate in discussions among the whole class or within smaller groups, search for information and exchange opinions with their peers, where there is both shared and individual responsibility for their success in the learning process. They also pointed out that students

work collaboratively with other students and with their teachers to achieve success, and that their role of team member is supported through the use of communication hardware and software.

Additionally, Dargham et al., (2012) suggested that teachers play a vital role in e-learning as collaborators. Additionally, they explained that teachers work with other teachers to create a variety of activities and to improve the instruction process. They also work with students to achieve the same ends. Vrana, Zafiropoulos and Drogalas (2006) and Al-Homod and Shafi, (2013) argued that providing teachers and students with opportunities to interact, collaborate and use educational technologies improves students' participation in the educational process (Vrana et al., 2006; Ibrahim et al., 2007). This indicates that e-learning creates real prospects for learners and teachers to get more involved in the learning process by allowing them to share their ideas and suggestions in different E-Learning modes (synchronous and asynchronous e-learning). Moreover, e-learning environments encourage students to construct knowledge and to communicate with the teacher to enhance learning experience and educational performance (Yongsheng, Yuanjiang, Yinghua and Yuanyuan , 2012).

- **Providing Flexibility in Learning Delivery**

One of the main potentials of e-learning is flexibility. The literature indicates that educational settings have been found to share certain common beliefs about the practical benefits that ELearning can provide in delivering flexible learning. As John Chambers, president and CEO of Cisco Systems stated; "There are two fundamental equalizers in life: the Internet and Education. E-learning eliminates the barriers of time and distance, creating universal, learning-on-demand opportunities for people, companies and countries. Al-Harbi (2010) supports the idea that e-learning transcends time and geographical barriers and offers new learning environments. Alkharang and Ghinea, (2013) and Kwofie and Henten, (2011) also agree with this concept and mention that the key benefit of e-learning is the provision of flexibility. In this context, many researchers support the fact that e-learning projects provide flexibility and offer improved learning environments

by focusing on learning without any bounded geographical location (Asiri et al., 2012). Kwofie and Henten, (2011) suggested that the flexibility of E-Learning can be provided by the various forms of learning materials which allow the learner to select from a variety of options based on their needs and demands. Dargham et al., (2012) specified that the flexibility of e-learning consist of different aspects relating to time, place and online feedback, as they increase the opportunities for life-long learning.

This indicates that e-learning implementation and development can generate flexible learning environments, bring together different people from different locations and increase accessibility to information. Al-Adwan and Semedly (2012) supported some of the above benefits of e-learning as they pointed out that E-Learning provides the opportunity to interact between teachers and students at any mode and from any source (Rajasingham, 2009).

E-Learning Challenges

While e-learning provides several benefits to educational settings which enhance the quality of education and develop the learning environments, conversely there remain many challenges which hinder the exploration and utilization of its opportunities (Kwofie and Henten, 2011; Bhuasiri et al., 2012; Alkharang and Ghinea, 2013). The multidimensionality of e-learning projects denotes the existence of an extensive multiplicity of challenges that hinder implementation and development. For example, as reported by Kwofie and Henten (2011) E-Learning is costly, involves conflict priorities, and requires technical and academic confidence, social support and motivation, technical skill and competency, and a stable technical infrastructure. Implementing E-Learning necessitates the examination of the following crucial factors: cost, time, technology, attitudes, management awareness and support and language (Alkharang and Ghinea, 2013). Furthermore, inherent issues of e-learning include: ICT infrastructure, accessibility issues, quality and efficiency of e-learning, usefulness of technology, and pedagogical consideration. Additionally, Bhuasiri et al. (2012) highlighted that the crucial factors of e-learning include: learners' characteristics and motivation, instructors'

characteristics, e-learning environment, institution and service quality, infrastructure and system quality, and course and information quality.

The literature indicates that there are various challenges to e-learning initiatives and projects. These can be categorized into the following groupings: human (individuals), technological, institutional and organizational, environmental, managerial and pedagogical, and ethical. For example, Alkharang and Ghinea (2013) put forward their work on e-learning barriers and challenges and grouped them into three categories: management (management awareness and support), technical (bandwidth, Internet speed technology infrastructure, computer and network security, privacy and data confidentiality) and language issues. Challenges facing the implementation of e-learning in the Arab Countries as follows: ICT infrastructure, culture, leadership and e-learning strategy, local content, copyright issues and instructors and learners.

Literature indicates that there are various challenges to e-learning initiatives and projects in general and in the Arab region in particular. Al-Adwan and Smedley (2012) support some of the previously mentioned challenges as (Rhema and Miliszewska, 2010) pointed out the following barriers to e-learning implementation: lack of appropriate infrastructure for ICT development, culture, lack of support, lack of technical skills, and motivation. Other evidence supporting previous challenges and barriers is found in the work of Rhema and Miliszewska (2010) as follows: cultural differences and sensitivities of e-learning users, language barriers, attitudes towards e-learning, awareness and motivation which affect students' satisfaction and capacity, technological challenges, and lack of management support, and curriculum development. Al-Tameem (2013) pointed out the challenges facing e-learning as follows: lack of adequate ICT infrastructure, security of the system, lack of efficient support and lack of efficient access.

However, to achieve the benefits and goals of e-learning initiatives and consequently the success of e-learning, it is essential to investigate the factors of e-learning success in order to increase the effectiveness of e-learning implementation

within educational settings, and eventually improvements in the quality of e-learning education.

Such obstacles should be resolved by focusing on success factors to create a conceptual framework for a successful implementation of e-learning. Such an approach is the main focus of this research. The aforementioned benefits and challenges of e-learning provide a brief mention of the changes that e-learning can provide for educational institutions. A critical issue for e-learning, and a motivation for this study, is the ability to create a successful e-learning environment to continue effectively and efficiently in the long run. One of the most prominent mechanisms to create successful systems, not only for e-learning but for any system with complex components, is to examine the Critical Success Factors of the system and analyze each factor to yield the desired results, as will be examined in the following sections.

E-Teaching and E-Learning Schools

Improving the quality of education and training is a critical issue, particularly at a time of educational expansion. ICTs enhance the quality of education in several ways:

1. By increasing learner motivation and participation in academic activities,
2. By facilitating the acquisition of basic skills, and
3. By enhancing teacher training (Wadi and Sonia, 2002).

ICTs are also transformational tools which, when used appropriately, can promote the shift to a learner-centered environment.

1. Motivating to learn

ICTs can enhance the quality of education in several ways, by increasing learner motivation and engagement, by facilitating the acquisition of basic skills, and by enhancing teacher training. ICTs are also transformational tools which, when used appropriately, can promote the shift to a learner centered environment. ICTs, especially computers and Internet technologies, enable new ways of teaching and learning rather

than simply allow teachers and students to do what they have done before in a better way. ICT has an impact not only on what students should learn, but it also plays a major role on how the students should learn. Along with a shift of curricula from “content-centered” to “competence-based”, the mode of curricula delivery has now shifted from “teacher centered” forms of delivery to “student-centered” forms of delivery. ICT provides Motivation to Learn.

ICTs such as videos, television and multimedia computer software that combine text, sound, and colourful moving images can be used to provide challenging and authentic content that will engage the student in the learning process. Interactive radio likewise makes use of sound effects, songs, dramatizations, comic skits, and other performance conventions to compel the students to listen and become more involved in the lessons being delivered. Some of the parents of the respondents opined that their children were feeling more motivated than before in such type of teaching in the classroom rather than the stereotype 45 minutes’ lecture. They were of the view that this type of learning process is much more effective than the monotonous monologue classroom situation where the teacher just lectures from a raised platform and the students just listen to the teacher. ICT changes the characteristics of problems and learning tasks, and hence play an important task as mediator of cognitive development, enhancing the acquisition of generic cognitive competencies as essential for life in our knowledge society. 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 and Jonassen, 2008), the influence of the technology on supporting how students learn will continue to increase.

2. Facilitating the acquisition of basic skills

The transmission of basic skills and concepts that are the foundation of higher order thinking skills and creativity can be facilitated by ICTs through drill and practice. Questions are drawn from all works of life ranging from academics, religious, cultural,

educational to contemporary issues, thereby facilitating the acquisition of basic skills amongst populace.

3. Enhancing teacher training

ICTs have also been used to improve access to and the quality of teacher training. Taking advantage of the Internet to provide better teacher professional development opportunities to in-service teachers. Courses include "Computers in the Information Society", "Education Reform," and "Future Society and Education." Online tutorials are also offered, with some courses requiring occasional face-to-face meetings.

Abrami (2001) found that ICT increases student engagement, which leads to an increased amount of time students spend working outside class. Yusuf (2005) showed that students in on-campus courses usually score better than their online counterparts, but this difference is not significant here. ICTs especially computers and Internet technologies enable new ways of teaching and learning rather than simply allow teachers and students to do what they have done before in a better way. ICT helps in providing a catalyst for rethinking teaching practice, developing the kind of graduates and citizens required in an information society, improving educational outcomes (especially pass rates) and enhancing and improving the quality of teaching and learning (Salawu, 2008; Pelgrum & Law, 2003). ICT can help deepen students' content knowledge, engage them in constructing their own knowledge, and support the development of complex thinking skills (Jhurreev, 2005; Wheeler, 2001; Yusuf, 2005).

Studies have identified a variety of constructivist learning strategies (students work in collaborative groups or students create products that represent what they are learning) that can change the way students interact with the content (Windschitl, 2002). Albert Bandura, Girasoli and Hannafin (2008) urge the use of asynchronous CMC tools to promote student self-efficacy and hence academic performance. Fister et al (2008) also depict the power of tablet PCs to improve mathematics instruction. ICTs have the potential for increasing access to and improving the relevance and quality of education. The use of ICT in educational settings, by itself acts as a catalyst for change in this

domain. 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 and Jonassen, 2008), the influence of the technology on supporting how students learn will continue to increase.

Educational Technology

Educational technology can be defined as a period of instruments that have demonstrated to be beneficial in enhancing students' learning. The term "technology" is used loosely in educational technology. Technology can relate to physical objects that humans utilize, such as machinery or hardware, but it can also apply to broader ideas, such as systems, organizational methods, and procedures (Bediang, Geissbuhler, Klohn, Stuckelberger, Nko'o, & Chastonay, 2013). According to them, modern technology is not restricted to projectors, laptop computers, and calculators. New tools, such as smart phones and cartoon games, are attracting a lot of interest. As a result, in order to be effective when using technology, teachers must be fully involved in the process by interacting with and employing a variety of technical devices and applications. According to researchers, approximate technology use can help boost educational productivity (Mereku, Yidana, Hodzi, Tete-Mensah, Tete-Mensah, & Williams, 2009).

Empirical Review

Bediang et al. (2013) concluded in their studies that technology enables teachers with well-developed working theories of the student learning to extend the reach and power of these theories; in the absence of these theories' technology enables mediocrity. Educational technology is involved in the facilitating of human learning through the systematic identification, development, organization and utilization of a full range of learning resources. Educational technology is also called learning technology. Tambo (2002) has observed that Cameroonian schools and classrooms are often bear of teaching mediums. This makes leaning extremely difficult for students because they often have no other media like film, computer program, model audiotape, television projectors.

Consequently, educational technology has awakened the attention of many educators the world over. Its effect on the teaching learning process has been the priority of the research.

In the result of their finding, Hennessy, Harrison, & Wamakote (2010) concluded that technology will and has always been part of classroom teaching and learning process. In view of the frequent changing nature of classrooms today, every technological development be it computers, internet, iPods, note-books, laptops, projectors, tapes audio and video CD's or the television, whatever they might be can be utilized to facilitate teaching and learning.

According to Moore & Kearsley (1996), ICT increases the flexibility of delivery of education so that learners access knowledge anytime and from anywhere. It influences the way students are taught and how they learn as now the processes are learner driven and not by teachers. They result points out that leaners are more prepared for lifelong learning as well as to improve the quality of learning. In concert with geographical flexibility, technology-facilitated educational programs also remove many of the temporal constraints that face learners with special needs (Moore & Kearsley, 1996). Students are starting to appreciate the capability to undertake education anywhere, anytime and anyplace. One of the most vital contributions of ICT in the field of education is Easy Access to Learning.

With the help of ICT, students now browse through e-books, sample examination papers, previous year papers and 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). Wider availability of best practices and best course material in education, which can be shared by means of ICT, can foster better teaching. ICT also allows the academic institutions to reach disadvantaged groups and new international educational markets. As well as learning at any time, teachers are also finding the capabilities of teaching at any

time to be opportunistic and able to be used to advantage. Mobile technologies and seamless communications technologies support 24x7 teaching and learning. Choosing how much time will be used within the 24x7 envelope and what periods of time are challenges that will face the educators of the future (Young, 2002).

Innovative use of Information and Communication Technology can potentially solve this problem. Internet usage in home and work place has grown exponentially (McGorry, 2002). ICT has the potential to remove the barriers that are causing the problems of low rate of education in any country. It can be used as a tool to overcome the issues of cost, less number of teachers, and poor quality of education as well as to overcome time and distance barriers (McGorry, 2002). People have to access knowledge via ICT to keep pace with the latest developments (Plomp, Pelgrum & Law, 2007). ICT can be used to remove communication barriers such as that of space and time (Lim and Chai, 2004). ICTs also allow for the creation of digital resources like digital libraries where the students, teachers and professionals can access research material and course material from any place at any time (Bhattacharya and Sharma, 2007; Cholin, 2005). Such facilities allow the networking of academics and researchers and hence sharing of scholarly material. This avoids duplication of work (Cholin, 2005). ICT eliminating time barriers in education for learners as well as teacher. It eliminates geographical barriers as learners can log on from any place (Sanyal, 2001; Mooij, 2007; Cross and Adam, 2007; UNESCO, 2002; Bhattacharya and Sharma, 2007).

ICT provides new educational approaches (Sanyal, 2001). It can provide speedy dissemination of education to target disadvantaged groups (UNESCO, 2002; Chandra and Patkar, 2007). ICT enhances the international dimension of educational services (UNESCO, 2002). It can also be used for non-formal education like health campaigns and literacy campaigns (UNESCO, 2002). Use of ICT in education develops higher order skills such as collaborating across time and place and solving complex real-world problems (Bottino, 2003; Bhattacharya and Sharma, 2007; Mason, 2000; Lim and Hang, 2003). It improves the perception and understanding of the world of the student. Thus,

ICT can be used to prepare the workforce for the information society and the new global economy (Kozma, 2005). Plomp et al (2007) state that the experience of many teachers, who are early innovators, is that the use of ICT is motivating for the students as well as for the teachers themselves. Bottino (2003) and Sharma (2003) mention that the use of ICT can improve performance, teaching, administration, and develop relevant skills in the disadvantaged communities. It also improves the quality of education by facilitating learning by doing, real time conversation, delayed time conversation, directed instruction, self-learning, problem solving, information seeking and analysis, and critical thinking, as well as the ability to communicate, collaborate and learn (Yuen et al, 2003). A great deal of research has proven the benefits to the quality of education (Al-Ansari 2006). Hepp, Hinostroza, Laval and Rehbein (2004) state that the literature contains many unsubstantiated claims about the revolutionary potential of ICTs to improve the quality of education. They also note that some claims are now deferred to a near future when hardware will be presumably more affordable and software will become, at last, an effective learning tool.

Theoretical Background

Constructivism Theory

From the work of psychologists like Jerome Bruner, Jean Piaget, and Lev Vygostsky, constructivist methods to teaching and learning have arisen. They are the two main pillars of the constructivist viewpoint. Cognitive constructivism and social constructivism are the two opposing viewpoints. They also share a lot of similar viewpoints on learning and learners. Donadsen (1994) stated that constructivist learning environments had eight distinct qualities

1. Constructivist learning environment provide multiple representations of realities.
2. Multiple representations avoid over simplification and represent the complexity of the real world.
3. It emphasizes knowledge construction instead of knowledge reproduction.

4. It also emphasizes authentic tasks in a meaningful context rather than abstract instruction out of context.
5. Constructivist learning provides learning environment such as real-world settings or case-based leaning instead of predetermined sequence of instruction.
6. It encourages thoughtful reflection on experience.
7. It enables content and context dependent knowledge construction.
8. It supports collaborative construction of knowledge through social negotiations, not competition amongst learners of recognition.

The core principle of constructivism is that human learning is created, and that learners build new information on top of past knowledge. This perspective contrasts significantly with one in which learning is defined as the passive transmission of information from one person (teacher) to another (student). The concept of constructivism is surrounded by two ideas. The first is that learners use what they already know to construct new knowledge, and the second is that learners challenge their understanding in light of what they learned in the new learning environment. Constructivism has significant educational consequences. To begin with, teaching is not the transmission of knowledge from the enlightened to the uneducated. Constructivist professors do not play the position of ‘sage on the stage,’ but rather serve as "guides on the side" who allow students to test the accuracy of their present understandings. (According to Wesley A. Hoover, 1996).

The current trend of learning theory is based on constructive learning where by teachers construct their new knowledge grounded on their previous knowledge and experiences assuming the surrounding environmental conditions around the learning situations in hand. In this line, teachers actively involved in their activities constructing their own new knowledge in a piece meal, like a journey to the new conceptual change, to a new schema of accommodation through assimilation process.

Constructivism is the theory that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. When teachers encounter something new, they reconcile it with previous knowledge and experience. They may change what they believe, or they may discard the new information as irrelevant. To be active creators of their knowledge however, they must be able to ask questions, explore and assess what they know. In the classroom, the constructivist view of learning means encouraging teachers to use active techniques such as experiments and real-world problem solving using authentic data if possible, and to create knowledge and reflect on their understanding.

Constructivism modifies the role of the teacher so that teachers help students to construct knowledge rather than reproduce a series of facts. The constructivist teacher provides tools such as problem-solving and inquiry-based learning activities like in e-learning setup so that teachers formulate and test their ideas, draw conclusions and inferences, and convey their knowledge in a collaborative learning environment. The teachers must understand the students' preexisting conceptions and guide the activities to address this knowledge and then build on it. Constructivist teachers encourage students to assess how the activity is helping them gain understanding. By questioning themselves and their strategies, students become expert learners as they learn how to learn, with the use of computers online and/or offline. The students then have the tools necessary to become life-long learners.

The teaching-learning method in e-learning is assumed to be self-directed learning (SDL), which is supported by the educational philosophy of constructivism. According to constructivism theory, e-learning is an active information process because knowledge generation is accomplished through individual experience, maturity and interaction with one's environment. Due to this point of view, the educational philosophy of constructivism is distinguished from objectivism in that the learner is regarded as a passive recipient of information (Rotter, 1989).

Learning performance in regards to e-learning is possibly lower than a crammed educational style based on objectivist educational philosophy, with the exception of a strategic approach relating to the efforts and studies for the pleasure of the self-learner. Lee et al., (2007) point that the SDL teacher is available as an assistant and guide for learning, not as a unilateral knowledge source and messenger. Learners enjoy e-learning by selecting knowledge and using it practically (Thatcher & Pamela, 2000).

As opposed to objectivism theory of learning which believes that knowledge is an independent, unchanging phenomenon which is passively transmitted from the teacher to the teachers, constructivists believe that knowledge is constructed within oneself; emphasis is given to sel-fregulated active learning. From its very nature therefore a course is highly attracted towards such self-regulated active learning through continuous exercises passing through a spiral development right from the ground of previous experiences. Constructivists are against the belief of the objectivists who are saying that teachers know what is important to the students (Creswell 2009, Cobern, 1996). William (2004) supports the constructivists' idea that knowledge is rather individually constructed and socially negotiated by teachers themselves based on prior knowledge.

As Yager (1991) and Cobern (1996) put it, the issue is how learning takes place rather than how it rationally develops. It is the issue of the content of thought rather than merely the formal operations of logic in which the learners themselves are primary actors. The ICT integrated learning is therefore highly recommended for facilitating individually constructed knowledge by supporting the teachers professional development, the students benefit there after promoting organizational learning (Mc Kenney, 2001). Choi (1995) express that knowledge is natural byproduct of an individual within the environment and context, which is supported by Wilson (1995) saying that constructivism tends to be holistic. This is taking sense of the world by taking information from the environment.

Shuell (1986) explain further that what a student does is more important than what the teacher does. Biggs (1999) adds that students depend on what they perceive, interpret and intend to do. So, the ICT integrated learning creates opportunities to facilitate such

interaction of learning. This supports Perking's (1991) idea that constructive learning environment if enhanced if reinforced to play more task oriented activities like in the electronic supported learning.

Since self-regulated learners are purposeful and strategic by generating and directing their own learning experience, rather than being externally controlled (Olaussen & Barten, 1999), the electronic integrated learning is assumed to scale up individual learning activities based on their prior experiences.

This study is therefore in line with the constructivism theoretical framework, assuming that conventional learning might be enhanced by the newly infused agent (el-earning). It is presupposed that it contributes to construct new knowledge over the existing ones, and initiates and facilitates learning towards independent learning. This is aiming the improvement of teachers' professional development at a better level. In return the electronic integration presumed to bring new trend of learning changing the role of the teacher into coaching status while the teachers are actively involved in self-regulated learning, constructing their own new knowledge internally. The expectation is that new teaching-learning system could be manifested through this new experience of learning using ICT reinforcing the conventional system for modification if not for a radical change which may come later on. Furthermore, individual learning styles differ and individual differences become even more important in the area of education specifically in mathematics. Therefore, the real challenge in e-learning is keeping the people in line of its design for the mind set up (Canavan, 2004; as quoted by Manochehr, n. d). In support of this, Hiltz (1993) indicate that a primary goal in studying a new medium of communication for education system must be the identification of its impact on learning which the aim of this study is. The study is therefore assumed to benefit from the understanding of teachers' own activity style by taking measures to adjust the way they acquire knowledge (Cwely et, al., 2002). So, e-learning may be effective in facilitating those with particular learning style since it is conducive for independent learning (Manochehr, n. d.).

Responsibilities for Teachers' Technological Effectiveness

- Teachers need to understand and support the importance of student learning to use information technology tools as an important component of their preparation for further education, work and life in general.
- Teachers need to demonstrate support of technology use by developing skills, knowledge and strategies necessary to model effective uses of technology.
- Teachers need to learn uses of technologies that provide assessment feedbacks to parents, students and other teachers about how well students are learning and then use that data to improve learning productivity.
- Teachers need to instill into their students the social, ethical, legal and human issues surrounding the use of technology.

Technological development and new opportunities put moral principles and ethical decisions to the test. Death and life, as well as their determination, are influenced and modified by technological advancements. Culture and values both shape and are shaped by technology. Technology cannot be separated from daily living. Technological resources are consumed, technological solutions are created and applied, and technological tools and products are routinely used. Yet people routinely misunderstand, misrepresent, and misuse technologies and technological products. Not everyone may think of technology but it may as well be if it is not understood (Ndongfack, 2015).

Facilitation Theory (The Humanist Approach)

Learning theory developed by Carl Rogers. One of the basic premises of this theory is that learning is possible because human beings have a 'natural eagerness to learn' and they are responsible for and at the center of the learning process (person-centered learning). E-learning is possible only because individuals signed up in it are self-driven and eagerness to learn. The role of the teacher is to act as a facilitator- no amount of effort on the part of the teacher can guarantee success, unless the learner has a desire and predisposition to learn.

An interesting contribution of Rogers's Facilitation Theory is the notion that learning involves changing one's self-concept. Such changes may involve discovering one's strengths or weaknesses. Learners in the e-learning setup have to perceive the possibility that there is in the e-learning system for knowledge acquisition. A freshly perceived self-concept has a consolidating impact on learning in that it allows the learner to attack a target skill with confidence or with an adjusted 'updated' approach.

Implicit in the non-direct facilitative approach is the assumption that learners can find the information by themselves (teachers merely *facilitate* that process), an assumption which downplays the role of information transmission and underestimates the contribution of teaching. Such a teaching model is obviously an idealization which is rarely found in its pure form in practice.

Summary of Related Review

Various studies have consistently demonstrated the satisfaction of student-teachers professional development in relation with E-learning methods. Learner's satisfaction rates increase with E-learning usage as compared to traditional learning, together with perceived ease of use and access and user friendly interface. Increased retention and enhanced hands-on application unlike traditional methods of teaching. E-learning supersedes training and instruction as it is a tool that improves behavior performance. Instructors in educational institution involved in providing the educational services to the students if an educational and or instructional system that makes use of the integration of technology and education be used. In one of the studies discussed in the review of related literatures, for example, particularly the one authored by Sherer and Shea (2011), the incorporation of technologies in classes and courses proved to be an effective method that appeared to have led to significant improvements in the level of learning.

In another comprehensive study which was authored by Kutter (2010), it has been concluded that the integration of education with technology has led to generalized improvements in the field of education, especially with the way how learning management systems have been used to help students and professors provide instructions

for and complete course works in a virtual learning environment, something which conventional methods of education and or learning systems would not allow. In summary, the results and evidences gathered from the review of related literatures all support the idea that integration of education with technology or at least the products of technology would most likely prove to be helpful for the students-teachers, the instructors, and the educational institutions alike.

CHAPTER THREE
METHODOLOGY

The procedures used to carry out the study are described in this chapter. The research design, geographical location, population, sampling technique, instrumentation, data processing plan, and research ethics are all included. It's required for gathering data that will indicate whether or not this study succeeds in achieving its intended result.

Research Design

The study adopted a mixed-methods research approach to ascertain the integration of e-learning on teachers' professional development. Research design according to Nworgu (1991) is a plan or blue print which specifies how data relating to a given problem should be collected and analyzed. It provides the procedural outline for the conduct of a given investigation. According to Nwana (9185), it is the strategy used by a scientist to collect and analyze the data necessary to test hypothesis. In this study, we adopted the descriptive survey design. A descriptive survey design is chosen because it involves various aspects of education including student learning, teachers' effectiveness, teaching methodology, instructional material, evaluation strategies. The purpose of this design is to provide a definite answer about best practices in teaching. It is also to develop new knowledge about the teaching learning situation to improve educational practice. Furthermore, it allows the study of representative samples which permits inference from the population that would be too expensive to study as whole. It was also discovered that the most appropriate design to be used is the descriptive survey design because it provides procedural outlines for the conduct of any given investigation. Equally, it is because, the descriptive survey design is the systematic means of data collection. This design was also adopted in order to determine the impact of teachers' effectiveness on students' performance.

Descriptive Survey designs are procedural in quantitative research in which investigators administer description to a sample or to an entire population of people to

describe attitude, opinion, behavior or characteristics of the population. In this way, descriptive survey researchers collect quantitative, numbered data using questionnaires and statistically analyze the data to describe trends about responses to questions and to test hypothesis. They also interpret the meaning of data by relating results to statistical test back to research study. In this exploratory research, a descriptive survey was conducted to gather information from students and teachers by means of structured questionnaires.

Furthermore, a research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Amin, 2005). The study employed a cross-sectional survey design. According to Creswell (2003) the survey is concerned with collecting data from usually a large number of respondents and data from usually a large number of respondents and data normally collected focuses upon the views, ideas and attitudes of the respondents in relation to the phenomenon under study. The design therefore gave consideration to the entire essential steps involved in the survey regarding the analysis of the effects of student-teachers professional development.

This study used a qualitative and quantitative approach and the method provides data for statistical purposes and for the effect of e-learning and student-teachers professional development at the GTTC of Mbalmayo.

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Study Area

The study area refers to the location where the research was conducted. This study was carried out in Cameroon- Mbalmayo. Mbalmayo is a town in Cameroon's Centre Region. The town had 60,091 inhabitants in 2023. It is the capital of the Nyong-et-So'o Division It is located at the banks of the Nyong river between Ebolowa and Yaoundé. It is an agricultural centre and has an important function as a centre of education. It has several primary and secondary schools owned by the government, Roman Catholic Church, Religious bodies and lay Private individuals. It is a beautiful town with many tourist attractions, once in town one can visit the Roman Catholic cathedral built during the colonial era, the water catchment at Akomnyada, the Marianne Sanctuary at Nkolbindi, two wood transformation factories Exam placage and COCAM, an old German brige across the Nyong river constructed by Germans in the early 1900s and so on. The hotel and lodging sector is fast growing with many modern hotels and lodging structures springing up like mushrooms. Cameroon was formerly divided administratively into ten provinces now referred to today as regions. Administration of these Regions is based on the administrative set up of Cameroon which is a decentralized state. Mbalmayo is politically and administratively managed under the Central region and a local collectivity called Mbalmayo municipal council. It is a sub-division of the Nyong-et-So'o Division. The administration of the division and the subdivisions is directly under the Ministry of Territorial Administration. Mbalmayo is the administrative headquarters of the Nyong et So'o division.

The study area was chosen first and foremost because the researcher is a Cameroonian who was born and raised in the country. Second, Cameroon has a large number of schools, and many graduates are interested in becoming teachers, particularly in secondary, elementary, and nursery schools. Third, there is a critical need for these young Cameroonians who want to be teachers to acquire the required academic and professional abilities, attitudes, and values for 21st-century learning. Fourth, Cameroonians' insatiable desire for electronic equipment such as computers, the Internet,

digital radios, digital televisions, and hand-held devices such as telephones prompted the researcher to conduct this study. Furthermore, the research was conducted in Government Teacher Training College. In Cameroon, basic education lasts two years for nursery and six years for primary school. It is worth noting that only general education college are included in the study.

Population of the Study

According to Amin (2005, p. 6), a population is defined as the 'complete collection (or universe) of all the elements (units) that are of interest in a particular investigation. The population of the study defines the limits within which the researcher's findings are applicable or are generalized'. Thus the population of the study was made up of student-teachers in institutions of teacher education in Mbalmayo, Cameroon.

Target Population

According to Amin (2005, p. 6), a target population is the population to which the researcher ultimately wants to generalize the results. He further explains that this target population may not be accessible to the researcher. The target population was made up of all the final year student-teachers and lecturers in the different Government Teacher Training institutions in Mbalmayo, Cameroon.

The target population of this study embarked on the entire teachers' professional development at the GTTC of Mbalmayo. Target population is described as a universal set of study of all members of real or hypothetical set of people, events or objects to which an investigator wishes to generalize the result as concluded by Borg *et al.*, (2009). Mugenda & Mugenda (2009) also defined target population as a complete set of individuals, case or objects with the same common observable characteristics. Due to the varying nature of the specific skills and experience required for this type of research, with a total teachers' population of 260. These teachers are chosen because of their experience in school as teachers. They have already learned fundamental teaching and technological skills, as educational technology is one of the subjects taught in all levels of education from kindergarten to tertiary. Second, the researcher believed that was the level at which

the study's data could be generated. The following presents the sample and sampling techniques.

Sampled or Accessible Population

This is the actual population from which the sample is taken (Amin, 2005). The accessible population was comprised of 260 teachers of GTTCs of Mbalmayo

Sample and Sampling Techniques

Saunders *et al.,* (2007) described the sample frame as a set of information used to identify a sample population for statistical treatment. (Mugenda & Mugenda, 2009) also described a sampling frame as a numerical identifier for each individual, plus other identifying information about characteristics of the individuals, to aid in analysis and allowing for division into further frames for more exhaustive analysis. The target all the teachers of the GTTC of Mbalmayo and the simple random sampling was be employed. According to Kothari (2004), a sample is usually drawn because it is less costly and less time consuming to survey than the population, or it may be impossible to survey the entire population. The sample size was determined using the Krejcie & Morgan (1970) mathematical table. This formula was used to obtain a representative sample of the target population. The target population is estimated at 260 teachers of the GTTC of Mbalmayo. From the 260 teachers, 152 were selected as the sample of this study based on Krejcie & Morgan.

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the sample size, N is the population size, e is the level of precision. In this study e was be equal to 10%. The sample size was therefore determined as follows:

$$n = \frac{150}{1 + 150\ (0.1)^2}$$

$$n = 108$$

After administering 108 questionnaires, 102 returned and were all exploitable. For the cases of the teachers of the GTTC, the researcher used random sampling enabled all teachers to get an equal chance of being part of the study.

Sources Data Collection Methods and Instruments

The Primary data in this study was gathered using the questionnaire method where form of a semi structured questionnaire was applied. The questionnaires in this study were self-administered and hand delivery to the respondents and were picked by the researcher for data analysis. Other documented sources such as books, journals, published and unpublished research works and internet literature also help in the secondary data. The main aim of this research study was to collect primary data which rely on the secondary data for the literature review purpose.

Questionnaire

A questionnaire is a set of written questions and or statements to which the research subjects are to respond in order to provide data, which are relevant to a research topic, (Mouton, 2001). A questionnaire was designed for data collection in accordance with the specifications of the research questions. This method involved the researcher designing and printing out closed ended questions based on a five Likert scale (SA=Strongly Agree, A=Agreed, N=Neither agree or disagree, D=Disagree and SD=strongly disagreed). The designed choice questions yielded responses from respondents in the study as this was a self-administered questionnaire. The method allows for larger sample to be used which should make the results more dependable and reliable (Amin, 2005). In addition, Creswell (2003) asserts that contents that questionnaire covers big areas over a short period of time. Questionnaires also offer greater assurance of anonymity thus enabling the respondents to give sensitive information without fear.

The questions have optional answers ranging from SD (1), D (2), NS (3), A (4) and SA (5) and were ranked as well from highest to lowest. The research tool had four sections which include; Section A: Background information of the respondents which

was obtained using close ended questions; Section B: ICT key factors; Section C: Digital classroom; Section D: the use of internet; Section E: Infrastructure and Section F: student-teachers professional development.

Both closed ended questions and open-ended questions are used so as to facilitate structured responses for the rating of various attributes and to provide additional respondents information. Referring to Arodho (2012) the questionnaire measures likelihood of straight, even and blunt answers was discussed later in this study. Kiess and Bloomquist (2009), recommended the use of the Likert-type format because according to this format yields equal-interval data, a fact that allows for the use of more powerful statistical statistics to test research variables in this study. Kothari (2004) in his research concluded that, the information obtained from questionnaires is free from any biasness and other researchers influence and hence accurate and valid data to allow draw the deduction in the area of study.

According to Crewell (2003), ―data analysis is a systematic search for meaning. It is a way to process qualitative data so that what has been learned can be communicated to others. In this study, the Researcher coded and analyzed the data from the questionnaire and observations using a constant comparative method (Amin, 2005). Throughout the process of data analysis the Researcher read through transcribed text, and then went back to carefully review the text line by line to build categories, develop codes, and insert memos. The data was continuously reviewed in order to compare it with the emerging categories.

Quantitative data analysis involved the use of descriptive analysis in the Statistical Product and Service Solution (SPSS). Descriptive statistics entailed determination of measures of central tendency such as mean; measures of dispersion such as standard deviation; frequency distributions; and percentages. Data was processed by editing, coding, entering, and then presented in comprehensive tables showing the responses of each category of variables. Analysis of research question one involved use of frequencies,

means and standard deviation, research question two and three were analyzed using descriptive statistics analysis.

Interview Guide

Interview is a purposeful interaction between two or more people. People who are in the process of communication, conversation and negotiation for a specific purpose associated with an agreed subject matter. In addition, Interview is a dialogue between a researcher and a respondent. It is a face-to-face contact between the researcher and the respondent with questions address to the respondent on the research topic. The information is collected through an interview guide. The data collected through this tools were used in the exploratory phase of the research, as well as in the interpretation of the results; because Quivy and Campenhoudt (1995) points out that, "the essential function of an interview in exploratory phase of a research is to highlight the dimensions of the problem to which the researcher would not have thought spontaneously". In addition, the guide was applied through the semi-structured interview, consisting of questions that the respondents answer freely helps the researcher to gather participants' responses in breadth and depth. This data is reported as narrative containing direct quotations from interview statements. It confers a sense of reality, describing accurately what the informants feel, perceive and how they behave (Burns, 2000). In this research, interviews investigate individual's experience and context, to achieve specific perspectives from respondents. The researcher gave respondents the opportunity to express all related views and was able to elicit additional information by probing and discussing answers. Consequently, this method also allows the researcher to interview the informants comprehensively by following key themes that need to be explored. In the cause of this research, 4 persons with deep knowledge on the topic under investigation were interviewed.

Further, the researcher asked each respondent the same questions in the same order to ensure that the interview data from one participant could be compared with the responses of others. The guide is developed based on the following:

- Briefly indicate to each participant the general objectives of the study and the crucial themes to be addressed.
- List the introductory and transition sentences that have been repeated identically for all interviews. This informs each interviewee of what is expected from her and this was formulated in a very open way, to encourage the start and continuation of the interview.
- Identify the main points that were the theme for further investigation
- Finally, this was done face to face, which permitted us to observe the gestures of the participants and facial expressions.

Measurement of Variables

The nominal scale was used to measure such variables as gender and marital status, among others. The level of perceived participation was rated on a five-point likert type scale. (Strongly agree to strongly disagree). Both open ended and closed ended questions were used for the all objective

Pilot Test

During the study, pilot study of the questionnaires was done before being administered to the targeted respondents in this study. The piloting help to guarantee clarity and sustainability of the language used to be used during the study. Further to this, the expert opinion from my research supervisor helped check on the content and constant validity of the research instruments. The importance of this pre-testing helps in finding out any weakness that might be contained in the research instruments. The pilot also help to determine whether the instruments are reliable and valid, hence checking whether the items would cover enough range of data required, test whether there is identifiable uncertainty in the structure of the questions in order to make improvement and disclose any errors in the questions and shortfalls in coding systems. A pilot study of 28 respondents was undertaken on from the targeted population through random sampling to check on the validity and reliability of the data collected. The reliability of the questionnaire was evaluated through Cronbach's Alpha which measures the internal

consistency. Orodho (2009), states that once a questionnaire is structured, it should be tried out in the field to enable the researcher determine the validity and reliability of the questions.

Validity

Mugenda and Mugenda (2009) concluded that validity is the correctness and significance of assumptions, based on the research results in the study. One major reason for conducting the pilot study institutes the strength of the questionnaire. In this study, both face to face interview and content validity to ascertain the validity of the questionnaires are employed engaged. Content validity draws a conclusion from test scores to a large domain of items similar to those on the test to be conducted during the study where rationality is concerned with sample-population in the area of study. The knowledge and skills covered by the test items is representative to the larger area of knowledge and skills as concluded (Gillham, 2008).

Reliability Analysis

The ability of a research instrument to consistently measure the characteristics of interest over time is referred to as reliability. A reliability test of research instruments is one that consistently produces the expected results. Kothari (2004) argue that instrument reliability refer to the level of internal consistency or the stability of the measuring strategies in the research area. It is argued that because of economy in time and labor, the procedure for extracting an estimate of reliability should be achieved from the management of a single test in the study.

According to Mugenda & Mugenda (2003) pilot testing help in revealing questions that are vague to allow for their review until they convey the same meaning to all the subjects (Mugenda & Mugenda, 2003). A pilot study of 28 respondents was undertaken on from the targeted population through random sampling. The reliability of the questionnaire was evaluated through Cronbach's Alpha which measures the internal consistency. The reliability values were checked for the four independent variables. The

results illustrated that all the four variables were reliable as their reliability values exceeded the prescribed threshold of 0.6 according to Loehlin (2004). The results of reliability analysis were as presented in the following table.

*Table 1.*Reliability Analysis

Study variables	Cronbach's Alpha (α)	Number of Items
Digital Classroom	0.87	6
ICT in Education	0.76	12
The use of internet	0.85	10
ICT Infrastructure	0.81	10

This part of the study is related to the methods and instruments that are used in gathering and analyzing data. It entails the research design; which is the blueprint of the study, population of study; which helps in the choice of the sample, sampling technique and the research instrument, procedure for analyzing data collected and method of data collection and analysis which involve the strategy and procedure for summarizing and exploring relationships among variables being considered in the investigation. The researcher used random sampling and purposive sampling because they are knowledgeable about the research problem. Simple random sampling enabled all student-teachers to get an equal chance of being part of the study. Purposive sampling was used to select to get the views of certain teachers.

According to Mugenda & Mugenda (2003) pilot testing help in revealing questions that are vague to allow for their review until they convey the same meaning to all the subjects (Mugenda & Mugenda, 2003). A pilot study of 28 respondents was undertaken on from the targeted population through random sampling. The reliability of the questionnaire was evaluated through Cronbach's Alpha which measures the internal consistency. The reliability values were checked for the four independent variables. The results illustrated that all the four variables were reliable as their reliability values

exceeded the prescribed threshold of 0.6 according to Loehlin (2004). The results of reliability analysis were as presented in table 4.2

Data Processing and Analysis

Mugenda and Mugenda (2009) developed the framework analysis where he applied the strategy to the research where the objectives of the study are reexamined where a specific outcome or recommendations are expected. He also maintained that other forms of qualitative analysis and other form of analysis also create room for developing ideas, making it both deductive and inductive during the study to be conducted. Data analysis should not be hurried. Though both quantitative and qualitative data can be analysed with the aid of computer (this is the idea behind Computer Aided Quantitative/Qualitative Data Analysis) saving some time. Nevertheless, adequate time is still required in using computer applications to analyse data, whether qualitative or quantitative.

Based on this study, and after familiarization, a list of key themes and topics is drawn up from the records which are used for future studies. This is as result of the objectives of the study and also the level of importance as expressed from the participants or even other topics that is mentioned frequently in this study. In reference to these themes, an indexing system is developed and applied to each record, using recommended Microsoft Computer software to reach to the conclusion. From this study, the coded data is sorted into categories where if appropriate, into subcategories to enable make a conclusion and hence the recommendations.

From this study, the key topics are then organized with reference to citations from the various respondents in the target section of sampled student-teachers. Finally, these entries are used to define concepts, map the range and nature of occurrences, create typologies and find associations between subjects with a view to provide explanations for the findings as concluded (Orodho, 2012). The study applies the open-ended questions in the questionnaire which is analyzed in the same way from the various respondents. Additionally, the frequencies of statements relating to certain topics are also counted.

These then help the topics to be ranked accordingly. The ranking is then used as an indicator for importance of the topic and for detection of gender-specific differences in the study.

The quantitative questionnaire data in the study is analyzed using descriptive statistics with the aid of SPSS version 22 as recommended in the social sciences. Based on the findings of the descriptive analysis, further analyses are used to give the outcome where the researcher discusses the findings and conclusions are drawn with clear recommendations. Further from conducted study, the data is analyzed using simple descriptive statistics such as percentages, means, modes, standard deviation and frequencies. Thereafter the data is edited to eliminate mistakes and ensure consistency. The data is then cleaned and coded using SPSS software and classified into m0.eaningful categories for analysis. This helps in assessing whether any associations between the variables exist in the study. Using the analyzed data, the salient details of the questionnaire is captured. Tables are used to present the findings, since tables are user friendly, easy to understand and display response frequencies as well as percentages of the respondents' opinions on subject under the study. The study also generated quantitative data, where descriptive statistics data analysis method is used to analyze numerical data gathered in the research. To compute measures, descriptive statistics of central tendencies and measures of variability was used in order to determine how independent variables affect the dependent variable as cited by (Cooper *et al.,* 2008).

CHAPTER FOUR
PRESENTATION AND ANALYSIS OF FINDINGS

This chapter analyses the data collected on the topic, the integration of e-learning and teachers' professional development and data was collected as per the set objectives in chapter one. The four specific objectives were to ascertain ICT as a key factor, digital classroom, c the use of internet and infrastructure and teachers professional development in GTTC of Mbalmayo.

Demographic Information

Distribution of the Respondents by Gender

The researcher requested the respondents to fill out their gender to ensure fair distribution of questionnaires to the male and female GTTC of Mbalmayo. From the data, 62.5% of the respondents were male while 37.5%of the respondents were female. This means slight gender gap on teachers where majority are male and GTTC of Mbalmayo has both men and women. The findings are presented in table 4.2 below.

Table 2. Distribution of the respondents by gender

Gender	Frequency	Percent
Female	95	62.5%
Male	57	37.5%
Total	152	100%

Distribution of Respondents by Age

To know which age bracket are the majority of teachers in GTTC of Mbalmayo, the respondents were asked their age, this is for general information and is not a direct objective of the study. The highest percent of the respondents were between the age brackets of 30-39 years represented by 19.0%. This was followed by 40-49 years with 41.4%, 25-29 years with 29.6% and 50 and above years with 11.1%. Most of the teachers were noted to be in the productive age below 39 years.

Table 3.Distribution of respondents by age

Age	Frequency	Percent
25-29 years	29	19.0%
30-39 years	63	41.4%
40-49 years	45	29.6%
50 and above	17	11.1%
Total	152	100%

Distribution of the Respondents of Teaching of Experience

The study further sought to find out the respondent's teaching experience. From table 4.3, 32.7% of the respondents have worked between 1 to 5 years, 20.3% worked for 6 to 10 years, 25% of the respondents 11 to 15 years, and employees who have worked for less than one year and over 15 years with 15.7% each.

Table 4.Teaching Experience

Teaching experience	Frequency	Percent
Less than 1 Year	11	7.3%
1-5	48	32.7%
11-15	38	25%
6-10	31	20.3%
Over 15	24	15.7%
Total	152	%

Digital Classroom and Teacher's Professional Development

The respondents were asked on the impact of digital classroom on teachers' professional development. A five-point likert scale was used where 5= strongly agree; 4= agree; 3= uncertain; 2 = disagree and 1= strongly disagree.

Table 5.Digital Classroom

	Statement	Mean	Std. Deviation
1	I like to use image media instruction	4.3043	0.95954
2	I like to use animation media instruction	4.3478	0.85451
3	I have the necessary experience to teach via e-learning	4.2754	1.02733
4	E-learning is more difficult to use in the learning and teaching process	4.46	.739
5	Having e-learning materials online 24/7 is practical for learning and teaching process	4.1014	1.11335
6	E-learning environment provides me with the opportunity of participating in e-classes	3.4638	1.37819

The study observed that they like to use image media instruction as represented by a mean and standard deviation of 4.3043 and 0.95954 respectively. The respondents strongly agreed that they like to use animation media instruction as represented by a mean and standard deviation of 4.3478 and 0.85451 respectively. The respondents strongly agree that they have the necessary experience to teach via e-learning as represented by mean and standard deviation of 4.2754 and 1.02733 respectively. It was also revealed that e-learning is more difficult to use in the learning and teaching process as represented by a mean and standard deviation of 4.46 and .739 respectively. The respondents strongly agreed that they having e-learning materials online 24/7 is practical for learning and teaching process as represented by a mean and standard deviation of 4.1014 and 1.11335 respectively. The respondents strongly agree that e-learning environment provides me with the opportunity of participating in e-classes as represented by mean and standard deviation of 3.4638 and 1.37819 respectively.

ICT in Education on Teacher's Professional Development

The respondents were asked on the influence of ICT in education on teachers' professional development. A five point likert scale was used where 5= strongly agree; 4 = agree; 3= uncertain; 2= disagree and 1= strongly disagree.

Table 6.ICT in Education

	Statement	Mean	Std. Deviation
1	E-learning is an effective medium for learning	3.28	1.300
2	I feel confident that I can teach a successful e-learning course	2.81	1.261
3	I find that designing e-learning content and materials is time consuming	2.72	1.253
4	I feel confident that I can develop an effective e-learning course	2.72	1.253
5	I intend to teach e-learning courses when I am given the opportunity	2.68	1.372
6	I am satisfied with developing my own e-learning courses	3.37	1.372
7	E-learning increases knowledge of the subject matter	3.37	1.326
8	I enjoy using computers in my teaching	2.78	1.381
9	I need technological skills for professional development	2.66	1.205
10	Technology is highly expected to in education	2.6567	1.28573
11	Technology in education is a positive sign to further economic development	2.3913	1.33083
12	Usually, I need assistance or training when it comes to using an e-learning system for the first time	2.7971	1.33083

The respondents were asked on the effect of ICT in education on teachers' professional development. The respondents agree that e-learning is an effective medium for learning as shown by a mean of 3.28, the respondents are uncertain that they feel confident when teaching a successful e-learning course as represented by a mean of 2.81 and the respondents are uncertain that they feel confident when developing an effective e-learning course as represented by a mean of 2.72. The respondents agree that they intend to teach e-learning courses when they are given the opportunity as represented by a mean of 3.28. The respondents are uncertain that they are satisfied with developing own e-learning courses 2.68. They agree that e-learning increases knowledge of the subject matter as represented by 3.37. They are uncertain that they enjoy using computers in teaching as represented by a mean of 2.78. The respondents are uncertain that they need technological skills for professional development represented by a mean of 2.66 and they are uncertain that technology is highly expected to in education as represented by a mean of 2.6567. The respondents were uncertain that technology in education is a positive sign to further economic development as represented by a mean of 2.3913 and uncertain that usually, they need assistance or training when it comes to using an e-learning system for the first time as represented by a mean 2.7971.

The use of Internet on Teachers' Professional Development

The respondents were asked on the effect of the use of internet on teachers' professional development. A five point likert scale was used where 5= strongly agree; 4= agree; 3= uncertain; 2 = disagree and 1= strongly disagree.

Table 7.The use of the internet

	Statement	Mean	Std. Deviation
1	I intend to use the Internet to support my teaching	4.42	. 847
2	I intend to use e-learning tools in my future teaching assignments	3.9275	1.27555
3	I am satisfied with using computers in my teaching	3.2319	1.20226
4	Availability of e-content is an essential point in e-learning implementation	3.3043	1.27538
5	I easy have access to the internet	3.5942	1.00468
6	It is easy to manage and update my e-content	3.6232	1.23790
7	My previous experience in using the PC and software applications helped me in the e-learning lessons	3.8116	1.23790
8	Internet connection is mostly provided through mobile broadband	3.8000	1.50208
9	I am connected through Wi-Fi and network broadband internet connectivity	3.70	1.047
10	The use of internet enhances teaching and learning	3.6522	1.22265

Some of the respondents agreed that they intend to use the internet to support their teaching as represented by 4.42 to a very great extent, they also agreed that they intend to use e-learning tools in their future teaching assignments as represented by a mean of 3.927 which is to a great extent, they also agreed that they satisfied with using computers in their teaching to a great extent as represented by a mean of 3.2319 from the study.

They agreed that the availability of e-content is an essential point in e-learning implementation as represented by a mean of 3.3043. The respondents also agreed that they easy have access to the internet as represented by a mean of 3.5942 from the survey conducted; they also agreed that it is easy to manage and update my e-content as represented by the mean of 3.6232. From the survey, they also agreed that their previous experience in using the PC and software applications helped them in the e-learning lessons as represented 3.8116.

The respondents also agreed that internet connection is mostly provided through mobile broadband as represented by a mean of 3.8000 from the survey conducted, they also agreed that they are connected through Wi-Fi and network broadband internet connectivity as represented by a mean 3.70 from this study, The respondents also agreed that the use of internet enhances teaching and learning as represented by 3.6522 from the survey conducted.

ICT Infrastructure on Teachers' Professional Development

The respondents were asked on the impact of ICT infrastructure on teachers' professional development. A five point likert scale was used where 5= strongly agree; 4= agree; 3= uncertain; 2 = disagree and 1= strongly disagree.

Table 8.ICT Infrastructure

	Statement	Mean	Std. Deviation
1	I can use any PC to prepare lessons	3.6522	1.19836
2	I am comfortable using my PC and software applications	4.1014	.90983
3	I understand the fundamental concepts on the issue of integrating IT in learning and teaching	4.1014	.80704
4	I suggest improvement of the traditional teaching with the usage of IT	3.9275	1.03354
5	There have been changes due to the application of IT	3.8406	1.00912

6	I am able to design and create a simple spreadsheet which presents data such as text and numeric in an appropriate format	4.0435	.81231
7	I use laptop to connect to the internet	3.9710	.99957
8	I use smart devices to connect to the internet	3.7826	.98324
9	I use desktop computer to connect to the internet	3.9242	.94967
10	Overall, e-learning environment infrastructure is effective and efficient	3.8095	.75897

From the study conducted it was concluded that they can use any PC to prepare lessons as represented by a mean of 3.6522. They are comfortable using PC and software applications to a very great extent as shown by mean of 4.1014 from the study conducted. They understand the fundamental concepts on the issue of integrating IT in learning and teaching strongly agreed as shown by a mean of 4.1014 from the study.

They suggest improvement of the traditional teaching with the usage of IT to a great extent as shown by a mean by 3.9275. There have been changes due to the application of IT to a great extent as shown by a mean of 3.8406 from the study conducted. The respondents agreed to a very great extent that they are able to design and create a simple spreadsheet which presents data such as text and numeric in an appropriate format as shown by a mean of 4.0435 from the conducted study. They use laptop to connect to the internet also to a great extent as shown by a mean of 3.9710.

They use smart devices to connect to the internet to a great extent as shown by mean of 3.7826. They use desktop computer to connect to the internet to a great extent as shown by a mean of 3.9242. Overall, e-learning environment infrastructure is effective and efficient as shown by a mean of 3.8095 as concluded by the study conducted.

Teachers' Professional Development

The respondents were asked on teachers' professional development. A five point likert scale was used where 5= strongly agree; 4= agree; 3= uncertain; 2 = disagree and 1= strongly disagree.

Table 9.Teachers' Professional Development

	Statement	Mean	Std. Deviation
1	The use of e-learning method is better in the learning and teaching process	3.9420	.82040
2	The use of e-learning is more beneficial for teachers' professional development	3.7826	1.23514
3	The use of e-learning is more advantageous for teachers' professional development	3.8986	1.03106
4	The use of e-learning is more enjoyable and satisfactory for teachers' professional development	3.7826	1.29330
5	The use of e-learning provides more control over learning for teachers' professional development	3.8406	1.23220
6	The use of e-learning is more encouraging and motivating for interaction	3.7826	1.09638
7	The use of e-learning requires more time and effort	4.1343	.90278
8	The use of e-learning is more effective and efficient than the traditional method	3.9701	.93695
9	The use of e-learning is more productive than the traditional method	3.9701	.85227
10	The use of e-learning improves the quality of learning and teaching process	4.0149	.84374
11	Overall, teachers' professional development is important for teaching and learning process	3.8657	.90278

The respondents agree to agree to an extent that the use of e-learning method is better in the learning and teaching process to a great extent as shown by mean of 3.9420 from the study conducted. The use of e-learning is more beneficial for teachers' professional development to a great extent as shown by mean of 3.7826 from the study conducted. The use of e-learning is more advantageous for teachers' professional development strongly agree as shown by mean of 3.8986 as per study.

The use of e-learning is more enjoyable and satisfactory for teachers' professional development to a great extent as represented by a mean of 3.7826. The use of e-learning provides more control over learning for teachers' professional development to a great extent as shown by a mean of 3.8406 from the study conducted. The use of e-learning is more encouraging and motivating for interaction to a great extent as shown by a mean of 3.7826 from the study.

The participants strongly agree that the use of e-learning requires more time and effort as represented by a mean of 4.1343. They strongly agree that the use of e-learning is more effective and efficient than the traditional method as shown by a mean of 3.9701 from the study conducted. The use of e-learning is more productive than the traditional method to a great extent the participants as shown by a mean of 3.9701 from the study. The use of e-learning improves the quality of learning and teaching process as represented by the mean of 4.0149 and overall, teachers' professional development is important for teaching and learning process as shown by a mean of 3.8657. During the interview, a participant 4 said that:

> Teachers do not have necessary training and even when they have are not motivated to make use of educational technology which can help the students learn better. This situation has for over the years been neglected since according to some educational sources "the schools are doing well anyway". If one looks deeply into this situation, it would not be too wrong for one to add that our schools are soon developing the adage of "let sleeping dogs lie". This may sound pitiful, yet there is

> a constant cry for the falling standards of our educational system (Interview, February 8, 2022).

At the higher levels, the government complains of lack of resources to fully equip the schools which are over growing in number. And at the implementation end, teachers complain of lack of time and resources to make use of educational system. Participant 1 said that

> Schools in Cameroon had been making efforts to evolve with the changing time. Another point of interest here that limits the possible use of some teaching and learning technologies in the teacher's ability to make use of them to achieve the intended learning outcome (Interview, February 20, 2022).

In Cameroon three major categories of schools are being operated; public, secondary and high school, technical, lay private secondary and mission (public, lay private and mission) schools. This provides a wider variety of ways in which recent educational reforms are being integrated into the school systems in Cameroon. Participant 3 pointed out that *new technology promise a wider range of teaching functions and a higher quality of learning lower costs, greater students control, more interaction and feedback for students* (Interview, February 2, 2022). Just as participant emphasized that; *to use educational technologies to accomplish a variety of educational delivery need has grown to a point where preparing teachers to use technologies is assumed to be the main function and primary interest of educational technologist system* (Interview, February 8, 2022). At the level of higher education, admissions to teacher education institutions are limited. The government admits a limited number of student-teachers that would be employed directly upon graduation from the school. Although the government is making a tremendous effort in the area of human and pedagogic resources, there is still a need to increase the number of teachers in schools and to improve the quality of initial training in teacher education establishments. The statistics and profiles of prospective teachers compared to the need reveals that existing institutions of teacher education cannot help

the country achieve the goals of Education For All (EFA) and the Millennium Development Goals (MDGs).

Interpretation of the Findings

The main objective of the study is to investigate the integration of e-learning on teachers' professional development in GTTC of Mbalmayo. The specific objective of the study were to ascertain the influence of digital classroom, to valorize ICT in education, to examine the use of internet and to discover ICT infrastructure impact on teachers' professional development at GTTCs of Mbalmayo. $P<0.05$, dependent variable; digital classroom, ICT in education, the use of internet and ICT infrastructure. From the table below the coefficients of the regression are used to come up with the following regression equation:

$$Y = 16 + 0.418\ X_1 + 0.194\ X_2 + 0.265\ X_3 + 0.488 X_4$$

Where X_1, X_2, X_3 and X_4 are digital classroom, ICT in education, the use of internet and ICT infrastructure respectively. The study established that taking all the factors being constant at zero, the employees' productivity is 16.647. The findings presented also show that holding all other independent variables at zero, a unit increase in digital classroom would lead to 0.418 growth in teachers' professional development, a unit increase in ICT in education would lead to 0.194 in teachers' professional development. A unit increase in the use of internet would lead to 0.265 teachers' professional development and a unit increase in ICT infrastructure would lead to 0.488 in teachers' professional development.

Table 10.

Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	16.647	2.452		6.79	0
Digital Classroom	0.418	0.204	0.404	2.052	0.051
ICT in Education	0.194	0.091	0.358	2.14	0.042
The use of the internet	0.265	0.116	0.416	2.292	0.031
ICT Infrastructure	0.488	0.161	0.533	3.021	0.006

a. Dependent Variable: Teachers' professional development

These results imply that increase in digital classroom would lead to positive teachers' professional development. An increase in ICT in education quality would lead to a positive teachers' professional development. An increase in the use of the internet would also lead to positive impact in teachers' professional development and finally ICT Infrastructure would lead to positive teachers' professional development in GTTC of Mbalmayo. ICT Infrastructure has the highest influence on teachers' professional development as represented by 0.488, followed by digital classroom as represented by 0.418, followed by the use of the internet as represented by 0.265 and ICT in Education as represented by 0.194. All the four variables were noted to have a positive influence on teachers' professional development of GTTC of Mbalmayo.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

This chapter comprises the summary of research findings as well as conclusions. The chapter further presents recommendations to the stakeholders of the ministry in concern as based on the views of the respondents (teachers) on the research findings, educational implication of study and suggestions for further study.

Summary of Findings

These results imply that increase in digital classroom would lead to positive teachers' professional development. An increase in ICT in education quality would lead to a positive teachers' professional development. An increase in the use of the internet would also lead to positive impact in teachers' professional development and finally ICT Infrastructure would lead to positive teachers' professional development in GTTC of Mbalmayo. ICT Infrastructure has the highest influence on teachers' professional development as represented by 0.488, followed by digital classroom as represented by 0.418, followed by the use of the internet as represented by 0.265 and ICT in Education as represented by 0.194. All the four variables were noted to have a positive influence on teachers' professional development of GTTC of Mbalmayo.

Discussions

This research work attempts to answer questions of e-learning and teachers' professional development in GTTC of Mbalmayo. The limitations and the challenges of its integration in education systems. ICTs are influencing all aspects of life including education. They are promoting changes in working conditions, handling and exchanging of information, teaching-learning approaches and so on. One area in which the impacts of ICT is significant is education. ICT is making major differences in the teaching approaches and the ways teachers develop their teaching skills. ICT-enhanced learning environment facilitates active, collaborative, creative, integrative, and evaluative learning as an advantage over the traditional method. In other words, ICT is becoming more appropriate in the realization and implementation of the emerging pedagogy of

constructivism that gives greater responsibility of teaching to teachers. Several surveys are showing that ICT use in education systems of developed nations has comparatively advanced than ICT use in education systems of developing nations.

In addition, the major promises of ICTs use in education systems of developing countries focus on training teachers and students in new skills and introducing innovative pedagogies into the classrooms, investing on ICT infrastructure for schools and creating networks among educational institutes, improving overall standard of education by reducing the gap in quality of education between schools in urban and rural areas, initiation of smart school with objectives to foster self-paced, self-assessed, and self-directed learning through the applications of ICTs, and developing ICT policy for education and training.

ICT is the convergence of communication, information and media technologies, which are based on the common digital technology (Sallai, 2012). ICT infrastructure/facility can be described as electronic device, equipment, or tool used for collection, processing, storage, retrieval or transfer of information, and its associated services. ICT infrastructure refers to the hardware or equipment, software applications, and services associated with ICTs, including telecom networks. Akinsola, Herselman and Jacobs (2005) stated that, ICT infrastructure could be categorized into hardware, which comprises telephone, computer, LAN network, hub, printer, scanner, television, fax, codec camera, projector, radio, Video CD, audio tape players and microphone, software that includes windows, Ms Office and others. ICT infrastructures comprise even the earlier technologies such as radio and television.

The principal device for processing, storage or retrieval of information is the computer. When two or more of these computers are interconnected, they form a network, and can intercommunicate and exchange information. The value of these computers to business, researchers, government and individuals actually increases greatly when they are so connected into networks. Networked computers can transmit voice messages, alphabetical and numerical data, and video over communication media.

Connections of computers into networks are of different categories depending on the needs of an organization. Local area networks join computer at a particular site, or within a small geographical spread, such as an office building or an academic campus. On the other hand, wide area networks interconnect computers and small networks to larger networks over greater geographic area, including different continents. In this category of networks, the computers, or smaller networks are linked by means of communication medium such as cables, optical fibres, wireless links, or satellites. Access to the networks is via a modem, a device that allows computers to communicate over telephone lines.

The largest wide area network in the world is the internet, a collection of networks and devices linking millions of computer users all over the world. This is a product of merged technologies of computer, computer networks and communication, and also the basis of modern day ICT infrastructures. Communication technologies include cable, satellite, fiber optics and wireless links. Network technologies include personal area network (PAN), campus area network (CAN), intranets, Extranets, LAN, WAN, and the internet. Computer technologies include disks, flash memories, multimedia projectors, interactive electronic boards, and personal computers (Anunobi and Edoka, 2010) Services and resources associated with both modern and the earlier technologies include distance/E-learning, videoconferencing, E-library, E-mailing, and the web.

Computer provides easy and efficient means of information processing, storage and retrieval making clerical and general administrative duties interesting. In higher education institutions, common ICT infrastructure and services are usually computers, the internet, and services related to the internet. Computer networks interconnect computers in the schools for easy communication, sharing of resources, and collaboration among students and lectures. E-learning makes education available even to remote positions and teleconferencing/videoconferencing enables transfer of services of experts from other schools. Additionally, the internet makes information search and access to variety of information easy. All these mean that in higher education institutions, common ICT

infrastructure and services are usually computers, the internet, and services related to the internet and they have obviously important impact on the activities conducted. Additionally, the extents to which an institution can provide all the necessary ICT facilities are a measure of the status of the institution.

The rapid proliferation of ICTs has paved way for technological advancements in education. Globally, many institutions are implementing different forms of ICTs in education using different modes such as electronic learning (e-learning) and mobile social learning (Asabere and Enguah, 2012; Xia et al., 2013, Asabere, 2013). Higher education is one of the most important sectors for developing the human capital of various countries worldwide. Through effective development of human capital, higher education enables various countries to support innovation and find new solutions for sustainable and justifiable growth (Muianga et al., 2013).

Pedagogic methods of education through ICT have to be adopted by teachers, researchers and learners respectively. Initially, teachers have to sensitize themselves with ICT methods of teaching to improve their pedagogy. This concept can then be transformed to students. The ICT competency and skills of both teachers, students and staff should be upgraded (Asabere, 2013; Buabeng-Andoh, 2012). There is a recognition that for Cameroon to make any considerable progress in its socio-economic development efforts, sustainable resources are needed to reduce the percentage of the population without educational achievement. This will widen the access to education by the enormous majority of the population and hence increase the percentage of population with tertiary level education (Asabere & Enguah, 2012; Asabere, 2013; Buabeng-Andoh, 2012).

Based on the research conducted, the findings revealed that integrating ICT in education in Accra Technical University is quite difficult due to: inadequate ICT infrastructure equipped in lecture rooms and laboratories, poor wireless access connectivity on campus and not enough Internet bandwidth for students and lecturers to access necessary resources for their education and research. Due to inadequacy of ICT

infrastructures, there isn't enough means of accessing online journals and an e-library. Furthermore, the software that are needed by both the lectures and students are not provided or are difficult to access thereby hindering the attainment of knowledge or skills of the ICT usage in education.

Based on the research conducted, the findings revealed that integrating ICT in education in GTTCs in Mbalmayo is quite difficult due to: inadequate ICT infrastructure equipped in lecture rooms and laboratories, poor wireless access connectivity on campus and not enough Internet bandwidth for students and lecturers to access necessary resources for their education and research. Due to inadequacy of ICT infrastructures, there is not enough means of accessing online journals and an e-library. Furthermore, the software that are needed by both the lectures and students are not provided or are difficult to access thereby hindering the attainment of knowledge or skills of the ICT usage in education.

Teaching competence' is a complex and integrated whole of qualities which a person cannot develop in a rush (Brouwer, 2007). In this context, reflective practice needs to be internalised as part of a teachers' professional identity. The issue of competences in the literature has two dimensions. One focuses on developing student competences; the other on teacher competences. From the perspective of teacher competence, a need has been identified in many countries for extended and new teacher competence to meet the challenges of education.

One technology that has the power to provide such professional development programs is e-learning. E-learning programs allow for interactive, multimedia communications. They combine text, audio, graphics, and video into an interactive software program that can be widely and quickly distributed electronically (Wentling, et al., 2000).

Simply because something is called e-learning does not mean that it is effective. The power of any e-learning program is in the quality of its contents and its integration of known principles of effective teacher development. For these reasons, these authors

believe that an e-learning program can only be called effective if controlled studies have been conducted measuring its impact teacher understanding of the intervention, teacher application of the intervention, and student learning as a result of teacher implementation. This fact underscores a second issue of concern and cost.

Many teachers in GTTC of Mbalmayo had not attained their teachers' professional competencies and qualifications. The rapid pace of technological innovation has gradually shaped a knowledge based society that requires "capabilities to identify, produce, process, transform, disseminate and use information to build and apply knowledge for human development.

Expectations for teaching and learning in this knowledge society have also undergone significant change. Teachers have had to move from their respected position in the society, as the sole knowledge provider, into facilitators who can prepare their learners to be citizens of the world. Teachers therefore need to shift their teaching models to incorporate learning capabilities, such as deep cognitive learning, creativity and ingenuity, problem solving, continuous learning and risk taking. Many teachers, however, are not ready to deal with the new challenges because they have been raised and educated in a conventional way. Research has shown that pedagogical transformation of a teacher can be facilitated through ongoing teacher professional development (TPD) (Darling Hammond, 1994). TPD allows teachers to reflect on their own practice through interactions with other practitioners, which improves their professional practice. Conventional TPD practices, however, may not be relevant to the needs of teachers in the knowledge society. These conventional TPD practices employ a directive top-down approach to facilitate professional learning. While the Cameroonian government is continually developing a number of strategic education policies and implementing various pathways to improve the professionalism of teachers, for a variety of reasons there are still a large number of teachers who struggle to access the professional development support provided by the government. Professional development is a necessary component to improve student learning. Professional development in ICTs has

a greatest potential influence on student academic performance as well as any observable patterns between professional development and student academic performance.

Formerly, schools depended on the face-to-face classroom teaching and learning experience but the advent of the technology age has brought about gadget that can improve such experiences. Various learning approaches are being put in place to compensate for the problems occasioned by this traditional learning paradigm. One of them has been the online instruction, which has the potential to provide opportunities for reflective and integrating learning outcomes. This approach when utilized provides the teachers with adaptive personalized e-learning experiences because it is a practical approach which is replicated by the teachers to improve learning outcomes. It involves digital classroom, the valorize ICT in education, the use of internet and ICT infrastructure. Many research has been carried out in Cameroon like in other countries on the future potentials of ICTs and distance education in the development process. However, little is known about e-learning, more specifically its role on the professional development of student teachers. It is important to know that the fact that an understanding of ICTs is not the end of the journey of course. Beyond awareness lies proactive involvement for those who really wish to make a difference in education.

In sum, the evidence to date suggests that, in the identification of competences, educators and policy-makers should avoid the reductionist 'checklist' trap. Competences should be flexible, holistic and incorporate interpersonal, intellectual, reflective and ethical values, as well as cognitive ones. From an educational perspective, the review suggests that outcomes are best defined in terms of intended learning outcomes of educational programs. The experience of several countries indicates that highly politicized or philosophically and empirically problematic definitions of outcomes are inappropriate. Clearly there is a balance to be struck between setting standards to ensure quality in teaching and teacher education, and to ensure equity and the public good, on the one hand and, on the other, to avoid an excessive emphasis on performativity.

Conclusions

The role of ICTs in the education is recurring and unavoidable. Rapid changes in the technologies are indicating that the role of ICT in future will grow tremendously in the education sector. By observing current activities and practices in the education, we can say the development of ICTs within education has strongly affected on a. what is learned? b. How it is learned? c. When & where learning takes place d. Who is learning and who is teaching. ICT also focuses modification of the role of teachers. In addition to classroom teaching, they will have other skills and responsibilities. Teachers will act as virtual guides for students who use electronic media. Ultimately, the use of ICT will enhance the learning experiences of students. Also it helps them to think independently and communicate creatively. It also helps both teachers and students for building successful careers and lives, in an increasingly technological world.

The benefits of ICT infrastructure in schools are quite enormous and the extents to which an institution can provide and utilize these ICT equipments define the status of the institution. Unfortunately, there is indication that ICT infrastructure is lacking in many schools in Cameroon and the utilization is low. The main ICT infrastructure and services utilized were identified to include the computer, the internet, E-mail services, the World Wide Web, website, and telephone. In the same way, ICT infrastructure and services oftentimes/frequently applied institution include the use of computers, use of the internet, E-mail services for online communication, use of the web to obtain information, use of website for information and online access, and the use of telephone.

Recommendations

The research conducted in this study confirmed the possibility of implementing an online learning community that facilitates ongoing professional development of teachers of GTTC in Mbalmayo. Based on this research, it is worth considering some issues that emerged as a result of this research as well as highlighting possibilities for further research. Several further implication of the study the practice, policy and research will be discussed the following.

1. We advise that both the teachers should develop personal interest in the use of ICT.
2. For sustainable integration of ICT in education, funding and other infrastructural issues should also be addressed
3. ICT should be made compulsory in institutions and the educators should be given proper training on its effective use.
4. ICT should be promoted all over the country and be made available and affordable to the people especially the educators and educational institutions.
5. Teachers in the training institutions should be imbued with the skills and abilities of ICT literacy and sensibilities so that the knowledge and attitude acquired will cascade onto the learners that they come in contact with in the classrooms when they begin to practice.
6. There is need to create an enabling environment for teacher education programs to strive toward producing highly qualified ICT literate teachers and teacher educators that would assist in making the integration and usage of ICT in schools a success.
7. Cameroon also needs to develop a specific policy for ICT in education; a national policy for ICT in education will help to locate Cameroon in the emerging global knowledge-based economy, coupled with strategic investment in education to enable greater productivity in the workforce and thus increased national competitiveness.

Areas for Further Study

The researcher opines that for further study, other scholars should:

1. A study can also be done on the effects of information technology on staff productivity.
2. Seek to address the perceived impact of government and private sectors on e-learning in schools.

3. Include a program of seminars, presentations, in-training discussions, and sharing and learning can be organized to engage teachers in social learning interactions about e-learning.
4. Investigate in advance the difference between social learning interactions in relation to teachers' professional development

REFERENCES

Abimbade, A. (2002). Perspective of Technology Integration and Effectiveness of Computer Assisted Instruction (CAI) in Primary Mathematics Classroom. Uniqua Research Chronicle, 4(2), 88-107.

Abrami, P.C. (2001). Understanding and promoting complex learning using technology. In P. Abrami (Ed.), Understanding and promoting complex learning using technology. Educational Research and Evaluation, 7 (2-3), 113-136

Adomi, E. E., Kpangban, E. (2010). Application of ICTs in Nigerian Secondary Schools, Library Philosophy and Practice (e-journal) March, pp. 1-9, Available at: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1353&context=libphilprac

Akinsola O. S., Herselman M. E., Jacobs S. J. (2005). ICT Provision to Disadvantage Urban Communities, A Study in South Africa and Nigeria. *International Journal of Education and Development using Information and Communication Technology (IJEDICT) 1*(3), pp. 19-41

Akomolafe C. O. (2009) Strategies and Challenges of Information and Communication Technology Infrastructure for University Education in Nigeria, *Revitalization of African higher education*, pp. 318-327

Anunobi C. V., Edoka B. E. (2010) Use of ICT Facilities for Serials Functions in Southern Nigeria Federal University Libraries, Library Philosophy and Practice (April) pp. 1-10, Available at: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1363&context=libphilprac

Asabere, N.Y., (2013). Using Information and Communication Technology (ICT) to Improve Polytechnic Education in Ghana, *International Journal of Computer Science and Telecommunications*, vol. 4, no. 9, pp. 1-7.

Asabere, N.Y. and Enguah, S.E., (2012). Use of Information & Communication Technology (ICT) in Tertiary Education in Ghana: A Case Study of Electronic Learning (E-learning), *International Journal of Information and Communication Technology Research*, vol. 2, no. 9, pp. 660-671.

Barker, K., andWendel, T. (2001). E-Learning: Studying Canada's Virtual Secondary Schools. Kelowna, BC: Society for the Advancement of Excellence in Education. Online at http://www.excellenceineducation.ca/pdfs/006.pdf.

Bediang, G., Stoll, B., Geissbuhler, A., Klohn, A. M., Stuckelberger, A., Nko'o, S., & Chastonay, P. (2013). Computer literacy and E-learning perception in Cameroon: the case of Yaounde Faculty of Medicine and Biomedical Sciences. *BMC medical education*, *13*(1), 1-8.

Béché, E. (2019). « En Afrique, la société change, l'école aussi doit se disrupter ». Eu tek watch, 003

Beebe, M.A. (2004). Impact of ICT revolution on the African academic landscape", In: CODESRIA Conference on Electronic Publishing and Dissemination, Dakar, Senegal, pp. 1–2.

Breuleux, A., Laferrière, T., and Lamon, M. (2002, May). *Capacity building within and across countries into the effective uses of ICTs*. Paper presented at the 2002 Pan-Canadian Education Research Agenda Symposium, Montreal, QC. Retrieved from http://www.cesc.ca/pcera2002E.html

Buabeng-Andoh, C., (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using Information and Communication Technology*, vol. 8, no. 1, pp. 136-155.

Burgess, S., & Sievertsen, H. H. (2020). Schools, skills, and learning: The impact of COVID-19 on education. VoxEu. org, 1(2).

Burns, M. (2019). *Information and Communications Technologies and Secondary Education in Sub-Saharan Africa: Policies, Practices, Trends and Recommendations.* Mastercard Foundation.

Calderoni, J. (1998). Telesecundaria: Using TV to Bring Education to Rural Mexico. Education and Technology Technical Notes Series: World Bank Human Development Network. Retrieved from http://wbln0018.worldbank.org/HDNet/HDdocs.nsf

Cameroon/World bank Report (2012). *Governance and Management in the Education Sector*. Report No. 67201-CM

Cavanaugh, C. S. (2001). The Effectiveness of Interactive Distance Education Technologies in K-12 learning: A Meta-Analysis. *International Journal of Educational Telecommunications, 7* (**1**), 73–88.

Chambers, E. A. (2003). *Efficacy of educational technology in elementary and secondary classrooms: A meta-analysis of the research literature from 1992–2002.* Ph.D. dissertation, Southern Illinois University at Carbondale. Retrieved November 8 2005, from ProQuest Digital Dissertations database. (Publication No. AAT 3065343).

Cheah H., Wong P. (2007) Enabling Teaching and Learning Through The Use of ICT in Singapore Universities, National Institute of education, Nanyang Technological University, Singapore Technical paper available at: http://www.rihed.seameo.org/mambo/uploadfiles/ict/ICT_Singapore.pdf

Cloete, N. and Maasen, P. (2015). Roles of universities and the African context", Knowledge Production and Contradictory Functions in African higher education, pp. 1–17.

Cooke, M. (2014). Clomedia: The evolution of e-learning [Electronic Version]. Accessed: 12 June 2014.

Dees, S. (1994). An Investigation Of Distance Education Versus Traditional Course Delivery Using Comparisons Of Student Achievement Scores In Advanced Placement Chemistry And Perceptions Of Teachers And Students About Their Delivery System (Satellite Course). Northern Illinois University.

DfES (2003). Towards a Unified E-Learning Strategy, London: DfES Economist Intelligence Unit Federal Ministry of Education (2014). In English. Retrieved on 20/1/2015. From http://www.fmegovng.org/ [Including links to parastatal organizations.

Dube, B. (2020). Rural online learning in the context of COVID 19 in South Africa: Evoking an inclusive education approach. REMIE: Multidisciplinary Journal of Educational Research, 10(2), 135-157.

Emerson, T.L.N., and Taylor, B.A. (2004). Comparing Student Achievement across Experimental and Lecture-Orientated Sections of a Principles of Microeconomics Course. *Southern Economics Journal*, 70, 672-693.

Fanso, T. D., & Ngwa, P. (2022). An Assessment of E-Learning Strategies in Enhancing Quality Education in Cameroon During the COVID-19 Pandemic in Cameroon: Case of Government Bilingual High School Yaoundé.

Federal Ministry of Education (2014): http://www.fmegovng.org/ [Including links to parastatal organizations. In English. Retrieved on 20/1/2015.

Garrison, R., & Anderson, T. (2003). *E-learning in the 21st century: A framework for research and practice.* London: Routledge Falmer.

Heeger, A. G. (2010). A close look at distance learning. Distance Learning Today, 1(2):1-13.

Hennessy, S., Harrison, D., & Wamakote, L. (2010). Teacher factors influencing classroom use of ICT in Sub-Saharan Africa. *Itupale online journal of African studies*, *2*(1), 39-54.

Hennessy, S., Onguko, B., Harrison, D., Kiforo, E., Namalefe, S., & Naseem, A. (2010). Centre for Commonwealth Education & Aga Khan University Institute for Educational Development–Eastern Africa Research Report No. 1 Developing the Use of Information and Communication Technology to Enhance Teaching and Learning in East African Schools':, no.

Hoover, W. A. (1996). The practice implications of constructivism. *SEDL Letter*, *9*(3), 1-2.

Horton, W. (2005). Leading e-learning; http://www.e-learningguru.com ASTD, pg.147.

Jhurreev, V. (2005)"Technology Integration in Education in Developing Countries: Guidelines to Policy Makers". *International Education Journal* [Electronic], 6(4):467-483.Available: *http://ehlt.flinders.edu.au/education/iej/articles/v6n4/jhurree/paper.pdf*.

Johnson, G.M. (2005). Student Alienation, Academic Achievement, and WebCT use. *Educational Technology and Society*, 8, 179-189.

Kearsley, G. (2000). *Online education: learning and teaching in cyberspace*. Belmont, CA.: Wadsworth.

Kibinkiri, E. L. (2014). *The Role of E-learning on the Professional Development of Student-teachers in Cameroon* (Doctoral dissertation, University of South Africa).

Kumah E. A.,Tanye H. A. (2009) Tertiary Students' View on Information and Communication Technology Usage In Ghana, *Journal of Information technology impact 9* (2) pp. 81-90

Lockwood, Fred and Gooley, Anne. (2001) *Innovation in open and distance learning: Successful development of online and web-based learning*. London: Kogan Page Ltd.

Lumadi, M. W., & Len, K. E. (2013). The Role of E-Learning in the Professional Development of Student Teachers in Cameroon: A Discourse in Curriculum. *Mediterranean Journal of Social Sciences*, *4*(13), 791-791.

Mahdinejad, V. and Amoii, M. (2011). Assessment of computer self-efficacy and attitudes toward computers in university students. Iranian Journal of Higher Education, 16(4):102-117.

Mereku, D. K., Yidana, I., Hodzi, W., Tete-Mensah, I., Tete-Mensah, W., & Williams, J. B. (2009). Pan-African agenda on pedagogical integration of ICT: Phase 1 Ghana report. *University of Education, Winneba. Canada: International Development Research Centre (IDRC)*.

Merlyne, D. D. A. (2021). IDENTIFICATION WITH THE INTELLECTUAL MODELS OF SUCCESS: A SYNERGY TO THE OPTIMIZATION OF THE SUCCESS PATH OF SECONDARY SCHOOL LEARNERS IN CAMEROON. *IJSSHR-International Journal of Social Science and Humanities Research*, *4*(01), 63-69.

Mkandawire, S. (2013). Survival of National Research and Education Networks (NRENs) in a competitive market of Africa: A case study of the Zambia Research and Education Network (ZAMREN)", Proceedings and Reports of the 6th UbuntuNet Alliance Annual Conference, pp. 185-192.

Ndongfack, M. N. (2016). Baseline Study on the Current Status of Open and Distance Learning in Cameroon.

Ndongfack, M. N. (2016). Design and development of a personal learning environment for corporate self-regulated learning. *J. Comput. Commun*, 1-9.

Ndongfack, M. N, (2010). ICT Integration in Cameroon Primary Schools: A Case Study of Government Primary Practicing School Angele, South Region. *Master's Dissertation, Kuala Lumpur: Open University Malaysia*.

Ndongfack, M. N. (2015). Mastery of active and shared learning processes for techno-pedagogy (MASLEPT): A model for teacher professional development on technology integration. *Creative Education*, *6*(01), 32.

Ndongfack, M. N. (2015). Teacher Profession Development on Technology Integration Using the Mastery of Active and Shared Learning for Techno-Pedagogy (MASLEPT) Model. *Creative Education, 6* (03), 295.

Naidu, S. (Ed.). (2003). *Learning & teaching with technology: Principles and practices*. Psychology press.

National Association of State Boards of Education. (2001). Any time, any place, any path, any pace: Taking the lead on e-learning policy. Alexandria, VA: author.

Nawaz, A. and Kundi, G.M. (2010). Digital literacy: An analysis of the contemporary paradigms, *International Journal of Science and Technology Education Research*, vol. 1, no. 2, pp. 19-29.

Ngwa, E. (2020). Online Learning: A New Approach to Learning for the Timid, Slow, and Anxious Secondary School Student, AFRO HUSTLER.

Niyazazari and Hosseini, 2012) Niyazazari, M., and Hosseini, Z. (2012). The Impact of ICT on Learning Math and English Language in High School Students. *Iranian Journal of Information and Communications Technology in Education Sciences*, 3(**1**):99-118.

Nsolly, N. B., & Charlotte, N. M. (2016). Integration of ICTs into the curriculum of Cameroon primary and secondary schools: a review of current status, barriers and proposed strategies for effective Integration. International Journal of Education and Development using ICT, 12(1).

Nworgu, B. G. (2007). *The Indispensability of ICT in Educational Research in Information Communication Technology in the Service of Education* Ed. By D. N. Ezeh and Nkadi Onyegegbu. Enugu: Timex.

Olaniyi, S. S. (2006) e-Learning Technology: The Nigeria Experience p.2-3. A Paper Presented at the Shape the Change XXIII FIG Congress Munich Germany, October 8-13, 2006. *The International Bureau of Education of UNESCO* (2014) :http://www.ibe.unesco.org/links.htm . Retrieved on 19/1/2015.

Olomo R.O. (2001). Mapping and the Internet; challenges and opportunities in Nigeria.

Olubamise, B. (2003). The information society and Nigeria. *Development Information Network,Nigeria*. Retrieved from http://www.jidaw.com/nigeria/devnet1.html

Osofisan A. O., Osunade O. (2007) ICT Infrastructures Available in Nigerian Educational and Research Institutes, Technical Report pp. 1-41 avaialable at: http://sist.cirad.fr/IMG/pdf/SIST_Nigeria_Country_Study.pdf

Oye, N. D., Salleh, M. and Iahad, N. A. (2010). Holistic E-learning in Nigerian Higher Education Institutions. *Journal of Computing*, 2(**11**):20-26.

Oye, N. D., Salleh, M., and Iahad, N. A. (2011). Challenges of e-learning in Nigerian University Education. Book Press.

Qaznavi, M. R. (2010). The Impact of ICT on the academic achievement of high school students in Khash City. Master's Thesis, Sari Branch of Azad University.

Pelgrum, W. J., Law, N. (2003) "ICT in Education around the World: Trends, Problems and Prospects" UNESCO-*International Institute for Educational Planning*. Available: *www.worldcatlibraries.org/wcpa/ow/02d077080fcf3210a19afeb4da09e526.html*.

Philip A., Oluwagbemi O., Oluwaranti A. (2010) An Evaluation of the Impact of Information and Communication Technologies Diffusion in Nigeria's Higher Educational Institutions, *Journal of Information Technology Impact 10* (1) pp. 25-34

Rotter, J. B. (1989). Internal versus external control of reinforcement: A case history of a variable. American Psychologist, 45,489-493.

Rosenberg, H., Grad, H. A., and Matear, D. W. (2003). The effectiveness of computer-aid, self-instructional programs in dental education: A systematic review of the literature. *Journal of Dental Education,67*(4), 524–532.

Rozina, I. (2002). Theory and Practice of Computer-assisted Communication in Russia: Present-day Situation and Future Perspectives. In: Theory of Communication and Applied Communication. *Journal of Russian Communication Association*. Issue 1

Salawu, B.A. (2008). ICTs for sustainable development: The Nigerian experience. Information, Society and Justice, 2, 115-135

Sallai Gy. (2012). The Cradle of the Cognitive Infocommunications, *Acta Polytechnica Hungarica, 9*(1), pp. 171-181

Schollie, B. (2001). Student Achievement and Performance Levels in Online Education Research Study. Edmonton, Alberta: Alberta Online Consortium. Retrieved from: http://www.albertaonline.ab.ca/pdfs/AOCresearch_full_report

Shekari, A. (2010). The effect of using ICT on the teaching-learning process in university academics. *Iranian Journal of Higher Education Curriculum*, 1(**2**):57-89.

Soleymanpour, J., Khalkhali, A. and Reayatkoonandeh, L. (2010). The Impact of ICT-Based Teaching on Sustainable Learning of Experimental Sciences. *Iranian Journal of Information and Communications Technology in Education Sciences*, 1(2):77-91.

Tchombe, T. M. (2004). Psychological Parameters in teaching. *Yaoundé, Cameroon: Presses Universitaires d'Afrique.(2001). Crisis of Learning Outcomes as a Function of Crisis in Learning Process among Adolescents: The shift From Teachability to Learnability. Journal of African Social Research*, (41), 91-113.

Tchamabe, M. D. (2011). L'impact des TIC sur les apprentissages scolaires des jeunes filles en Afrique: les cas des Centres de Ressources Multimédia de deux Lycées publics du Cameroun. The Impact of ICT on school learning of girls in Africa: the

case of Multimedia Resource Centres of two public secondary schools in Cameroon.

Thatcher, J. B., and Pamela, L. P., 2000. An empirical examination of individual traits as antecedents to computer anxiety and computer self-efficacy. *MIS Quarterly*, Vol. 26.

The International Bureau of Education of UNESCO (2014): http://www.ibe.unesco.org/links.htm. Retrieved on 19/1/2015.

Towndrow, P. A. (2005). Teachers as digital task designers: an agenda for research and professional development. *Journal of Curriculum Studies*, *37*(5), 507-524.

Wadi, D., and Sonia, J. (2002). ICT for Education: Potential and Potency. In W. Haddad and A. Drexler (Eds.), Technologies for Education: Potentials, Parameters, and Prospects (Washington DC: Academy for Educational Development and Paris: UNESCO).

Wheeler, S. (2001). Information and communication technologies and the changing role of the teacher. *Journal of Educational Media*, **Vol.** 26, No. (1), Pp;7-17.\

Yanuschik, O. V., Pakhomova, E. G., & Batbold, K. (2015). E-learning as a Way to Improve the Quality of Educational for International Students. Procedia Social and Behavioral Sciences, 215, 147-155.

Yasin, K. and Luberisse, Y. (1997). Meeting the Needs of a New Democracy: Multichannel Learning and Interactive Radio Instruction in Haiti: A Case Study. Washington, DC: USAID. Retrieved from http://ies.edc.org/pubs/book11.htm.

Yidana, I. (2007). *Faculty perceptions of technology integration in the teacher education curriculum: A survey of two Ghanaian universities*, PhD Dissertation, Ohio University, USA.

Yusuf, M. O. (2005a) Information and Communication Technology and education: Analysing

the Nigerian national policy for information technology. International Education Journal 6(3), 316-32

Yusuf, M. O. (2005b). An Investigation into teachers' self-efficacy in implementing computer education in Nigerian secondary schools. Meridian: A Middle School Computer Technologies Journal, 8(2).

Zameni, F. and Kardan, S. (2011). Impact of using ICT on learning mathematics. Iranian *Journal of Information and Communications Technology in Education Sciences*, 1(**1**):23-38.

Zameni, F., Nasimi, A., Rezayirad, M. and Ghanbarpoor, M. (2011). The impact of multimedia applications on the academic achievement of students in a sociology class. Iranian Journal of Information and Co

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****
DOCTORAL RESEARCH UNIT FOR SCIENCE OF EDUCATION
****
DEPARTMENT OF CURRICULUM AND EVALUATION

QUESTIONNAIRE

Dear Respondent,

My name is Chuyong Vera Beri**,** a Master II student in the University of Yaounde I, Faculty of Education in the department of Curriculum and Evaluation. I am researching on the theme." The integration of e-learning on teachers' professional development in GTTC of Mbalmayo".

Your willingness to participate in this research study is highly appreciated. This questionnaire is designed to elicit your responses to ameliorate the integration of e-learning on teachers' professional development. Any information given by you will be treated with confidentiality in conformity with the disposition of Article 5 of Law No. 91/023 of 16 December 1991 on census and statistical investigation activities. Therefore, be candid in expressing your opinion as much as possible.

Thank you

APPENDIX

APPENDIX I: RESEARCH STUDY QUESTIONNAIRE

INSTRUCTION: Please, place a tick on the number corresponding to the right answer provided below.

SECTION A:

1. **Demographic Information**

Please tick your gender

Male ☐ Female ☐

2. **Which is your Age group?**

Age (years)	Below 19	20-29	30-39	40-49	Above 50

3. **Teaching Experience**

Teaching Experience	Less than 1 Year	1-5 years	6-10 years	11-15 years	Over 15 years
Tick one only					

SECTION B: DIGITAL CLASSROOM

Statement	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
I like to use image media instruction					
I like to use animation media instruction					
I have the necessary experience to teach via e-learning					
E-learning is more difficult to use in the learning and teaching process					
Having e-learning materials online 24/7 is practical for					

learning and teaching process					
E-learning environment provides me with the opportunity of participating in e-classes					

SECTION C: ICT IN EDUCATION

Statement	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
E-learning is an effective medium for learning					
I feel confident that I can teach a successful e-learning course					
I find that designing e-learning content and materials is time consuming					
I feel confident that I can develop an effective e-learning course					
I intend to teach e-learning courses when I am given the opportunity					
I am satisfied with developing my own e-learning courses					
E-learning increases knowledge of the subject matter					
I enjoy using computers in my teaching					
I need technological skills for professional development					
Technology is highly expected to in education					
Technology in education is a positive sign to further economic development					
Usually, I need assistance or training when it comes to using an e-learning system for the first time					

SECTION D: THE USE OF THE INTERNET

Statement	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
I intend to use the Internet to support my teaching					
I intend to use e-learning tools in my future teaching assignments					
I am satisfied with using computers in my teaching					
Availability of e-content is an essential point in e-learning implementation					
I easy have access to the internet					
It is easy to manage and update my e-content					
My previous experience in using the PC and software applications helped me in the e-learning lessons					
Internet connection is mostly provided through mobile broadband					
I am connected through Wi-Fi and network broadband internet connectivity					
The use of internet enhances teaching and learning					

SECTION E: ICT INFRASTRUCTURE

Statement	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
I can use any PC to prepare lessons					
I am comfortable using my PC and software applications					
I understand the fundamental concepts on the issue of integrating IT in learning and teaching					
I suggest improvement of the					

traditional teaching with the usage of IT					
There have been changes due to the application of IT					
I am able to design and create a simple spreadsheet which presents data such as text and numeric in an appropriate format					
I use laptop to connect to the internet					
I use smart devices to connect to the internet					
I use desktop computer to connect to the internet					
Overall, e-learning environment infrastructure is effective and efficient					

SECTION F: TEACHERS' PROFESSIONAL DEVELOPMENT

Statement	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
The use of e-learning method is better in the learning and teaching process					
The use of e-learning is more beneficial for teachers' professional development					
The use of e-learning is more advantageous for teachers' professional development					
The use of e-learning is more enjoyable and satisfactory for teachers' professional development					
The use of e-learning is more encouraging and motivating for interaction					
The use of e-learning requires more time and effort					
The use of e-learning is more effective and efficient than the					

traditional method					
The use of e-learning is more productive than the traditional method					
The use of e-learning improves the quality of learning and teaching process					
Overall, teachers' professional development is important for teaching and learning process					

Interview Questions

Demographic/Background

1. Which language do you speak (French or English)?
2. What is your designation (Grade)?
3. What is your position in your institution?
4. How long have you been a teacher?

Semi-Structured Interview Questions

1. In your own experience can you describe e-learning in teachers' development?
2. How do you think e-learning affects teachers' teaching experience?
3. How have you expanded your understanding of e-learning principles and technologies recently?
4. Does e-learning improve your knowledge in any way?
5. Do you have experience in this particular e-learning niche?

APPENDIX 3: SAMPLE SIZE DETERMINATION

Table giving recommended sample size (s) for given populations (N)

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	1000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	14	550	226	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76		159	750	254	2600	335	100000	384

Source: Krejcie and Morgan (1970)

"S" is sample size

Using the above methods as a guideline, the following section aims to compare two approaches in determining the sample size of a population using a) Krejcie and Morgan (1970) and b) Cohen Statistical Power Analysis.

Estimation of sample size in this research using Krejcie and Morgan was employed.

Krejcie and Morgan (1970) used the following formula to determine the sampling size.

$S = X2NP (1 – P) / d2 (N – 1) + X2P (1 – P)$

S = required sample size

X2 = the table value of chi-square for one degree of freedom at the desired confidence level.

N = the population size

P = the population proportion (assumed to be .50 since this would provide the maximum sample size)

d = the degree of accuracy expressed as a proportion (.05)

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*****
DEPARTMENT OF CURRICULUM AND EVALUATION

Le Doyen

N°396/21/UYI/FSE/VDSSE

AUTORISATION DE RECHERCHE

Je soussigné (e), **Professeur BELA Cyrille Bienvenu**, Doyen de la Faculté des Sciences de l'Education de l'Université de Yaoundé I, certifie que l'étudiante **CHUYONG Vera Beri**, Matricule **19Y3491**est inscrite en Master II à la Faculté des Sciences de l'Education, Département : ***CURRICULA ET EVALUATION***, filière : ***MANAGEMENT DE L'EDUCATION,*** Spécialité : **PLANIFICATION DES SYSTEMES EDUCATIFS**

L'intéressée doit effectuer des travaux de recherche en vue de la préparation de son diplôme de Master. Elle travaille sous la direction du **Dr KIBINKIRI Erik Len.** Son sujet est intitulé : **«Challenges contemporary planners encountered and the development of the educational sector in cameroon».**

Je vous saurai gré de bien vouloir la recevoir et mettre à sa disposition toutes les informations susceptibles de l'aider à conduire ses travaux de recherches.

En foi de quoi, cette attestation de recherche lui est délivrée pour servir et valoir ce que de droit /.

Fait à Yaoundé, le 16 JUIN 2021

Pour le Doyen et par ordre

Le Vice-Doyen

Etienne
Professeur