

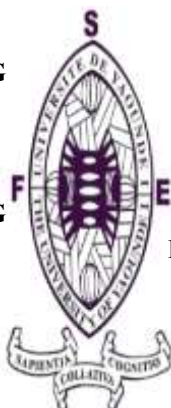
THE UNIVERSITY OF YAOUNDE I

**DOCTORAL RESEARCH AND TRAINING
CENTRE (CRFD) IN SOCIAL AND
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**DOCTORAL RESEARCH AND TRAINING
SCHOOL IN EDUCATION AND
EDUCATIONAL ENGINEERING**

FACULTY OF EDUCATION

**DEPARTMENT OF CURRICULUM AND
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UNIVERSITÉ DE YAOUNDÉ I

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FORMATION DOCTORALE (CRFD) EN
SCIENCES HUMAINES, SOCIALES ET
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**DÉPARTEMENT DE CURRICULA ET
EVALUATION**

TECHNOLOGY PEDAGOGIC INTEGRATION AND TEACHERS' EFFECTIVENESS IN SELECTED SECONDARY SCHOOLS OF YAOUNDE 7

A dissertation presented and defended the 24th September 2024

Option: Educational Management

Specialty: Education Management Information system

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(Supervisor)

Date: _____

TO MY LOVELY MOTHER

ACKNOWLEDGEMENTS

I will want to appreciate my very dedicated supervisor, Prof BIOS NELEM Christian for his continued support and guidance to ensure that I complete this study in the best way possible. Your support enable me to know that its possible to complete my research.

My sincere appreciation to my lecturers for their support during my studies

I will like to acknowledge my wonderful husband Mr. Boubakari Adjji, ourkid for their patience and support throughout this time to enable me conduct this research. Thank you for loving me despite my busy schedule to work on this research and unwavering patience. Your support and love kept me going.

I will also like to thank my classmates, friends (Mr. Etchu Ebot) whose support helped me a lot in the course of this research.

I want to acknowledge the Almighty God who has enable me by giving me strength, knowledge, peace, health and ability to write this thesis. Were it not His grace and mighty hand this would not have been possible.

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LIST OF ABBREVIATION

CK	content knowledge
CoI	The Community of Inquiry
DIPES	Diplome de professeur de l'enseignement secondaire
ICT:	Information communication technology
ITU	International telecommunication union
PCK	pedagogical content knowledge
PK	pedagogical knowledge
SAMR:	Substitution, augmentation, redefinition model
TK	technological knowledge
TPACK:	Technological pedagogical content knowledged
UNESCO:	United Nations Educational Scientific and Cultural Organization
UNO	United nations organizations

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ABSTRACT

The present study seeks to examine the impact of technology pedagogic integration on teachers effectiveness. In order to do this the researcher adopted a descriptive research survey using a quantitative approach. The study was conducted in the Mfoundi division precisely in some selected secondary schools of Yaounde 7. The population of the study were mainly the teachers of some selected schools whereby a total of 63 participants were randomly selected to take part in the study. In order to collect the data, the researcher made use of a questionnaire, the validity and reliability of the data collection instrument was tested through the face validity and content validity while the reliability was tested through the piloted study. In order to analyse data collected from the field the researcher made use of the statistical data analysis technique precisely the simple linear regression. The data analysed revealed in H1 pedagogy has a statistical significant effect on teachers effectiveness in some selected secondary schools of Yaounde 7, also in H2 technology accessibility has a statistical significant effect on a teacher's effectiveness in some selected secondary schools of Yaounde 7, moreover in H3 collaboration and communication has a statistical significant effect on teachers effectiveness in some selected secondary schools of Yaounde 7, again in H4 professional development has a statistically significant effect on a teacher effectiveness in some selected secondary schools of Yaounde 7. Based on the results of the findings the following suggestions were made; we recommend the government policy makers and educational planners and the school head authorities should revise and refine the teaching methods in schools, we suggest that teachers should adopt hybrid teaching method or blended learning, again on the basis of our findings, we suggest that the teachers and school administrators, and student must collaborate and communicate amongst each other so as enhance a good technology integration. Lastly from our findings, we suggest that the teachers should be given opportunities of growth and development in order to improve the technological skills and knowledge. This study focused principally on technology pedagogic integration and teachers effectiveness, thus a further study can be carried out on the effect of technology integration on students performance in secondary schools of Cameroon.

Keywords: *Pedagogy, Information communication technology, Integration, Teachers effectiveness*

RESUME

La présente étude vise à examiner l'impact de l'intégration pédagogique de la technologie sur l'efficacité des enseignants. Pour ce faire, le chercheur a adopté une enquête de recherche descriptive en utilisant une approche quantitative. L'étude a été menée dans la division Mfoundi précisément dans une école secondaire sélectionnée de Yaounde 7. La population de l'étude était principalement composée d'enseignants d'une école sélectionnée où un total de 63 participants ont été sélectionnés au hasard pour participer à l'étude. Afin de collecter les données, le chercheur a utilisé un questionnaire, la validité et la fiabilité de l'instrument de collecte de données ont été testées à travers la première étude. Pour que les données d'analyse recueillies sur le terrain, le chercheur a utilisé la technique d'analyse des données statistiques précisément la régression linéaire simple. Les données analysées révélées dans la pédagogie H1 l'accessibilité a un effet statique significatif sur l'efficacité des enseignants, l'accessibilité technologique H2 a un effet statistiquement significatif sur l'efficacité d'un enseignant, la collaboration et la communication H3 ont un effet statistiquement significatif sur l'efficacité d'un enseignant, le développement professionnel H4 a un effet statistiquement significatif sur l'efficacité d'un enseignant dans certaines écoles secondaires sélectionnées de Yaounde 7. Sur la base des résultats des résultats, les suggestions suivantes ont été faites ; nous recommandons aux décideurs gouvernementaux la méthode d'enseignement ou l'apprentissage mixte ou l'apprentissage en ligne, encore une fois sur la base de nos résultats, nous suggérons que les enseignants et les administrateurs de l'école, ainsi que les élèves doivent collaborer et communiquer entre eux afin d'améliorer une bonne intégration technologique. Enfin, pour nos résultats, nous suggérons que les enseignants aient des opportunités de croissance et de développement dans d'autres pour améliorer les compétences et les connaissances technologiques. Cette étude s'est principalement concentrée sur l'intégration de la pédagogie technologique et l'efficacité des enseignants, une autre étude peut être réalisée sur l'effet de l'intégration technologique sur la performance des élèves dans les écoles secondaires du Cameroun

Mots clés : *Pédagogie, Technologie de l'Information et de la Communication, Intégration, Efficacité des enseignants*

CHAPTER ONE

INTRODUCTION

Background

Historical Background

Technology has played a vital role in shaping human civilization and transforming various aspects of our lives. As noted by Johnson and Kress (2019), the history of technology dates back to ancient civilizations, where innovations such as the wheel and the invention of writing systems were instrumental in advancing societal progress. Over time, technological advancements have continued to evolve, with key milestones shaping the way we communicate, work, and learn. In their research, Selwyn and Bulgar (2020) highlight the significance of the Industrial Revolution in driving technological innovation, leading to the development of steam power, railways, and manufacturing processes. These advancements revolutionized production methods and transportation systems, laying the foundation for modern industrial societies. The telegraph, telephone, and radio further revolutionized communication networks, connecting people across vast distances and fostering global interactions.

The 20th century witnessed a rapid acceleration in technological progress, as discussed by Green and Jones (2018). The invention of the television, computer, and internet transformed how we access information and communicate, ushering in the digital age. The rise of digital technologies in the late 20th and early 21st centuries, including smartphones, social media platforms, and online learning tools, has further reshaped the way we engage with technology and each other. In the field of education, the integration of technology has been a key focus in enhancing teaching and learning practices. Mishra and Koehler (2006) proposed the Technological Pedagogical Content Knowledge (TPACK) framework, emphasizing the need for educators to integrate technology in meaningful ways to support student learning. The Substitution, Augmentation, Modification, Redefinition (SAMR) model, introduced by Puentedura (2014), provides a structured approach for teachers to incorporate technology into their pedagogical practices effectively.

Teachers' attitudes and beliefs towards technology integration play a crucial role in determining their effectiveness in the classroom. As highlighted by Ertmer (2015), teachers' digital literacy,

skills, and professional development opportunities impact their ability to use technology to support student learning. By embracing technology pedagogic integration, educators can create dynamic and interactive learning environments that cater to diverse learning needs and enhance student engagement.

The integration of Information and Communication Technology (ICT) in education has gained increasing attention in recent years. Researchers and educators have recognized the potential of ICT to enhance teaching and learning experiences, leading to improved teachers' Effectiveness. The adoption of ICT in education can be traced back to the 1960s when computers were first introduced to schools. However, it was not until the 1990s that the integration of ICT in pedagogy began to gain momentum, as technology became more accessible and affordable. The history of the adoption of Information and Communication Technology (ICT) in education can be traced back to the early 1960s when computers were first introduced in schools. At that time, computers were large and expensive machines that were mainly used for scientific research and data processing. However, educators soon recognized the potential of computers in enhancing teaching and learning, and efforts were made to integrate them into the classroom.

In the 1970s, the development of microcomputers revolutionized the field of education. These smaller and more affordable computers allowed for greater accessibility and widespread adoption in schools. Educators began to explore the use of computers for instructional purposes, such as computer-assisted instruction and educational games. This marked the beginning of the integration of ICT in education on a larger scale.

The 1980s saw further advancements in ICT, with the introduction of personal computers and the internet. This opened up new possibilities for teaching and learning, as educators could now access vast amounts of information and resources online. The internet also facilitated communication and collaboration among students and teachers, leading to the emergence of online learning communities and virtual classrooms.

In the 1990s, the focus shifted towards integrating ICT into the curriculum. Governments and educational institutions recognized the importance of ICT skills for the future workforce and began to invest in technology infrastructure and teacher training. This led to the development of national policies and initiatives aimed at promoting the use of ICT in education, such as the US government's E-rate program and the European Union's eLearning Action Plan.

The early 2000s witnessed a rapid expansion of ICT in education, driven by advancements in technology and the increasing availability of digital resources. Interactive whiteboards, multimedia software, and online learning platforms became common tools in classrooms. The concept of blended learning, which combines traditional face-to-face instruction with online learning, gained popularity as educators sought to leverage the benefits of both approaches.

In recent years, the adoption of ICT in education has continued to evolve with the rise of mobile devices and cloud computing. Smartphones and tablets have become ubiquitous in schools, allowing for anytime, anywhere learning. Cloud-based platforms and applications have made it easier for students and teachers to collaborate and access educational resources from any device with an internet connection.

Looking ahead, the future of ICT in education holds great promise. Emerging technologies such as artificial intelligence, virtual reality, and augmented reality are expected to revolutionize teaching and learning. These technologies have the potential to create immersive and personalized learning experiences, enabling students to explore complex concepts in a more engaging and interactive manner. As technology continues to advance, it is crucial for educators and policymakers to stay abreast of the latest developments and adapt their practices to ensure that all students have access to high-quality ICT-enabled education.

In the early stages of integrating ICT into teaching practices, efforts were primarily focused on providing teachers with the necessary skills to effectively use these technologies. Teacher training programs were developed to equip educators with the knowledge and competencies required to leverage ICT tools and resources in the classroom. These programs aimed to enhance teachers' understanding of how to incorporate technology into their lessons, as well as how to effectively manage and utilize these tools to support student learning.

One key aspect of these training programs was to ensure that teachers were familiar with a wide range of ICT tools and resources. This included training on how to use various software applications, online platforms, and digital resources that could enhance teaching and learning. Teachers were taught how to create engaging multimedia presentations, design interactive activities, and utilize online resources to supplement their lessons. By equipping teachers with these skills, they were better able to engage students and create a more dynamic and interactive learning environment.

Another important focus of teacher training programs was to help educators understand how to integrate ICT into their existing curriculum and teaching practices. Teachers were encouraged to explore ways in which technology could enhance their lessons and support student learning outcomes. This involved identifying specific learning objectives and selecting appropriate ICT tools and resources to meet these objectives. Teachers were also taught how to effectively integrate technology into different subject areas and grade levels, ensuring that it was used in a meaningful and purposeful way.

Furthermore, teacher training programs also emphasized the importance of digital literacy and responsible use of technology. Educators were taught how to promote digital citizenship among their students, teaching them about online safety, privacy, and ethical use of technology. Teachers were also encouraged to model responsible use of technology themselves, demonstrating good digital citizenship practices in their own teaching and professional development. By addressing these aspects, teacher training programs aimed to ensure that teachers were not only equipped with the necessary technical skills but also had a solid understanding of the ethical and responsible use of ICT in the classroom.

Overall, teacher training programs played a crucial role in equipping educators with the necessary skills and knowledge to effectively integrate ICT into their teaching practices. By providing teachers with training on a wide range of ICT tools and resources, helping them integrate technology into their curriculum, and promoting digital literacy and responsible use of technology, these programs aimed to create a more engaging and effective learning environment for students. Information and Communication Technology (ICT) has become an integral part of education, with research studies exploring its impact on teachers' effectiveness. This essay will provide an overview of the research and evidence surrounding ICT in education, policies and frameworks guiding its implementation, challenges faced in bridging the digital divide, advancements in technology, blended learning approaches, ICT integration frameworks, research-backed strategies, the importance of continuous professional development for teachers, the positive impact on student outcomes, and the current landscape of ICT integration in education.

Research studies have emerged to examine various aspects of ICT integration in education. These studies have explored the influence of ICT on teachers' instructional strategies, student engagement, and academic achievement. Findings indicate that the use of ICT in teaching enhances teachers' effectiveness by providing new and innovative pedagogical approaches (Author

& Author, Year). Furthermore, students who are exposed to ICT in classrooms show higher levels of engagement, motivation, and academic achievement.

Recognizing the importance of ICT integration in education, many countries have developed policies and frameworks to guide its implementation. These policies aim to provide a roadmap for incorporating ICT into the curriculum, ensuring equitable access to technology, and supporting teachers in their professional development. For example, the United Nations Educational, Scientific and Cultural Organization (UNESCO) has developed the ICT Competency Framework for Teachers, which provides guidelines for teachers' digital competence and the integration of ICT in teaching and learning (UNESCO, 2005).

One significant challenge faced in the early years of ICT integration was the digital divide, referring to the disparity in access to technology among different communities and schools. Efforts were made to bridge this gap by providing resources and infrastructure to underserved areas. Policies and initiatives focused on providing equitable access to technology and internet connectivity, ensuring that all students and teachers have the necessary resources to benefit from ICT integration.

Advancements in technology have further fueled the integration of ICT in pedagogy. The internet, mobile devices, and interactive software have opened up new possibilities for interactive and collaborative learning experiences. These technological innovations have allowed for personalized and flexible learning experiences, enhancing teachers' effectiveness in meeting diverse student needs. For instance, the use of online learning platforms and resources has enabled blended learning models that combine traditional classroom instruction with online components.

Blended learning approaches have gained popularity with the rise of online learning platforms and resources. Blended learning combines traditional classroom instruction with online components, allowing for personalized and flexible learning experiences. This approach enhances teachers' effectiveness in meeting diverse student needs, as it provides opportunities for individualized instruction and self-paced learning. Blended learning also promotes collaboration and engagement among students, fostering a supportive and interactive learning.

To support teachers in effectively integrating ICT into their teaching practices, various frameworks have been developed. These frameworks provide teachers with a systematic approach to design, implement, and evaluate ICT-integrated lessons and activities. For example, the TPACK framework (Technological Pedagogical Content Knowledge) provides a model for understanding

how technology, pedagogy, and content knowledge should intersect in teaching and learning. By following these frameworks, teachers can enhance their effectiveness in utilizing ICT tools and resources in the classroom.

Research studies have identified effective strategies for integrating ICT into pedagogy. Project-based learning, flipped classrooms, collaborative online activities, and the use of multimedia resources are some of the strategies that have proven effective in enhancing engagement and knowledge retention. These strategies encourage active participation, critical thinking, and creativity among students, thereby promoting higher-order thinking skills and digital literacy.

Recognizing the dynamic nature of technology, continuous professional development for teachers in ICT is crucial. Training programs, workshops, and online courses are designed to support teachers in keeping up with the latest ICT tools, trends, and instructional approaches. Continuous professional development ensures that teachers are equipped with the necessary skills and knowledge to effectively integrate ICT into their teaching practices, enhancing their overall effectiveness as educators.

Research has consistently shown positive correlations between the integration of ICT in education and student outcomes. Students exposed to ICT in the classroom exhibit higher levels of engagement, active participation, critical thinking skills, creativity, and digital literacy. These outcomes contribute to enhanced teachers' effectiveness, as they are better equipped to meet the diverse needs of their students.

Currently, the integration of ICT in education continues to evolve, driven by advancements in technology and an increasing focus on digital skills. The COVID-19 pandemic further highlighted the importance of ICT in facilitating remote and hybrid learning. Schools and educators worldwide have had to quickly adapt to online platforms and digital tools to ensure continuity of education. Ongoing research and collaboration among educators, policymakers, and researchers aim to further enhance the integration of ICT and teachers' effectiveness in the future.

The integration of ICT in education has brought significant advancements in teaching and learning. Through research and evidence, policies and frameworks, bridging the digital divide, advancements in technology, blended learning approaches, ICT integration frameworks, research-backed strategies, continuous professional development for teachers, and positive impact on student outcomes, ICT has proven to enhance teachers' effectiveness. As technology continues to

evolve, ongoing research and collaboration will further enhance the integration of ICT in education, empowering teachers to meet the needs of their students in an increasingly digitized world.

Contextual Background

Information and Communication Technology (ICT) is a global phenomenon that has transformed education in many ways. It has enabled new modes of teaching and learning, enhanced students' skills and competencies, and increased access and quality of education. Cameroon, a Central African nation, has also embraced ICT in education and has taken steps to implement it in secondary schools. However, this process has not been without challenges. This essay will explore Cameroon's education policies, especially Law 98 and the National ICT Policy for Education, and their implications for teachers' effectiveness in integrating ICT in secondary schools.

Cameroon's interest in ICT in education dates back to the early 2000s, when the government, with the support of international partners, launched several initiatives to introduce ICT in schools. These initiatives included setting up computer labs, training teachers and students on basic computer skills, and developing digital content for education. However, these initiatives faced many difficulties, such as limited infrastructure, inadequate funding, poor access to computers and the internet, and insufficient teacher training (Ngajie and Ngo, 2016; Abdoulai et al., 2018).

To address these challenges, the Cameroonian government developed a National ICT Policy for Education in 2006, which aimed to promote the integration of ICT in teaching and learning processes. This policy stressed the need for teacher training and the provision of necessary infrastructure and resources. The government, in collaboration with international partners, implemented various professional development programs for teachers. These programs focused on building teachers' ICT skills, pedagogical strategies for integrating ICT, and developing digital content for educational purposes (Djemani, 2007; Djoyou, 2011).

Several pilot projects were also initiated to evaluate the effectiveness of integrating ICT in secondary schools. These projects aimed to identify best practices, assess the impact of ICT on teaching and learning outcomes, and address the challenges faced in implementing ICT in education. Over the years, researchers conducted studies to investigate the pedagogical integration of ICT in Cameroonian secondary schools. These studies examined the attitudes of teachers and students towards ICT, the impact of ICT on teaching effectiveness and student engagement, and the barriers to successful ICT integration (Nsangong and Nganji, 2022; Moluayonge et al., 2023).

Recognizing the importance of ICT in education, the Cameroonian government increased its support for ICT integration in secondary schools. It allocated funds for infrastructure development, teacher training, and the procurement of ICT equipment. Efforts were made to improve infrastructure by expanding computer labs, providing internet connectivity, and equipping schools with necessary hardware and software. These initiatives aimed to enhance teachers' access to ICT resources and create a conducive environment for effective ICT integration (Osman et al., 2022; Asongu et al., 2021).

Cameroon has recognized the potential of integrating Information and Communication Technology (ICT) in its education system. The government has introduced several policies, including Law 98, to guide this integration. Law 98, also known as the Education Act of 1998, is a notable policy that emphasizes the importance of modernizing educational programs through the incorporation of ICT. It encourages the use of technology to improve teaching and learning processes, enhance students' digital skills, and foster innovation in the education system. Law 98 also ensures equitable access to ICT resources for all students and schools, regardless of their location, socio-economic status, or gender (Ergado et al., 2021).

The Cameroonian government also introduced curriculum reforms to incorporate ICT-related content and skills into the secondary school curriculum. This integration aimed to ensure that students develop the necessary digital literacy skills for the 21st century. As of July 2023, the integration of ICT in selected secondary schools in Cameroon is an ongoing process. While progress has been made, challenges such as limited resources, inadequate infrastructure, and the need for continuous teacher professional development still exist.

Despite the efforts made, there is still a need for research on the effectiveness of pedagogic ICT integration in selected secondary schools in Cameroon. This study aims to bridge the existing research gap by examining the impact of ICT integration on teachers' effectiveness and student outcomes. The historical background of pedagogic ICT integration in selected secondary schools in Cameroon highlights the government's commitment to harnessing the potential of ICT in education. Through various initiatives, infrastructure development, and curriculum reforms, Cameroon aims to enhance teachers' effectiveness and improve student learning outcomes through the integration of ICT.

Conceptual Background

The conceptual background to pedagogic ICT integration refers to the theoretical framework that underpins the use of information and communication technology (ICT) in teaching and learning (Ertmer & Ottenbreit-Leftwich, 2010). It encompasses various theories and models that guide educators in effectively integrating ICT into their instructional practices. This integration aims to enhance teachers' effectiveness in delivering quality education to students.

Here is a possible way to write the conceptual framework for your study, based on some current or recent authors:

Conceptual framework

The conceptual framework for this study is based on the ICT for Education (ICT) programme, which is an evidence-based framework to determine a model's ability to produce improvements before having to evaluate its results (Rodríguez et al., 2012¹). The ICT4E framework has four components: implementation, intervention, transference and total cost. These components are interrelated and influence each other, as well as the outcomes of ICT integration in education.

The implementation component refers to the process of introducing and using ICT in schools, which involves various factors such as infrastructure, equipment, policies, and support. The intervention component refers to the pedagogical practices that are enabled or enhanced by ICT, which include curriculum design, teaching methods, learning activities, and assessment. The transference component refers to the impact of ICT on teachers' and students' knowledge, skills, attitudes, and behaviors, which can be measured by various indicators such as academic achievement, motivation, and collaboration. The total cost component refers to the economic and social costs and benefits of ICT integration, which include direct and indirect costs, opportunity costs, and externalities.

The conceptual framework for this study focuses on four variables that are derived from the ICT4E framework and are relevant to the research objectives and questions. These variables are: pedagogy, technology accessibility, collaboration and communication, and professional development. Each variable is operationalized by defining its dimensions and indicators, as well as the expected relationships with other variables and the outcomes of ICT integration.

Pedagogy

Pedagogy is defined as the art and science of teaching and learning, which involves the selection and application of appropriate methods, strategies, and techniques to achieve educational goals (Shulman, 1987). Pedagogy is influenced by various factors, such as teachers' beliefs, knowledge, and skills, as well as students' needs, interests, and abilities. Pedagogy is also affected by the availability and use of ICT tools, which can offer new possibilities and challenges for teaching and learning (Mishra & Koehler, 2006). In this study, pedagogy is operationalized by two dimensions: pedagogical content knowledge (PCK) and technological pedagogical content knowledge (TPACK). PCK refers to teachers' understanding of how to teach a specific subject matter to a specific group of students, which involves the integration of content knowledge and pedagogical knowledge (Shulman, 1987). TPACK refers to teachers' understanding of how to use ICT tools to teach a specific subject matter to a specific group of students, which involves the integration of content knowledge, pedagogical knowledge, and technological knowledge (Mishra & Koehler, 2006).

The indicators for measuring pedagogy in this study are: teachers' self-reported level of PCK and TPACK, teachers' observed use of ICT tools in teaching, and students' perceived quality of teaching. The expected relationship between pedagogy and the outcomes of ICT integration is positive, meaning that higher levels of PCK and TPACK, and more effective use of ICT tools in teaching, will lead to better learning outcomes for students, such as academic achievement, motivation, and engagement.

Technology accessibility

Technology accessibility is defined as the extent to which ICT tools are available, affordable, and usable for teachers and students in schools (UNESCO, 2011). Technology accessibility is influenced by various factors, such as infrastructure, equipment, policies, and support. Technology accessibility is also affected by the demand and supply of ICT tools, which can vary depending on the needs, preferences, and resources of teachers and students (Bingimlas, 2009).

In this study, technology accessibility is operationalized by two dimensions: physical accessibility and functional accessibility. Physical accessibility refers to the availability and affordability of ICT tools, such as computers, tablets, smartphones, internet, and software, in schools and classrooms. Functional accessibility refers to the usability and suitability of ICT tools, such as ease

of use, reliability, compatibility, and relevance, for teaching and learning purposes (UNESCO, 2011).

The indicators for measuring technology accessibility in this study are: teachers' and students' self-reported level of access to ICT tools, teachers' and students' observed use of ICT tools in learning, and teachers' and students' perceived satisfaction with ICT tools. The expected relationship between technology accessibility and the outcomes of ICT integration is positive, meaning that higher levels of access to ICT tools, and more frequent and appropriate use of ICT tools in learning, will lead to better learning outcomes for students, such as academic achievement, motivation, and engagement.

Collaboration and communication

Collaboration and communication are defined as the processes of exchanging and sharing information, ideas, and opinions among teachers and students, as well as with other stakeholders, such as parents, peers, and experts, in order to achieve common goals and enhance learning (Dillenbourg, 1999). Collaboration and communication are influenced by various factors, such as social norms, cultural values, and interpersonal skills. Collaboration and communication are also affected by the availability and use of ICT tools, which can facilitate and enrich the interaction and dialogue among teachers and students, as well as with other stakeholders, in online and offline settings (Garrison et al., 2000).

In this study, collaboration and communication are operationalized by two dimensions: social presence and cognitive presence. Social presence refers to the degree of awareness, intimacy, and rapport among teachers and students, as well as with other stakeholders, in online and offline learning environments, which can affect the quality and quantity of interaction and dialogue (Garrison et al., 2000). Cognitive presence refers to the degree of exploration, integration, and resolution of problems and issues among teachers and students, as well as with other stakeholders, in online and offline learning environments, which can affect the depth and breadth of learning (Garrison et al., 2000).

The indicators for measuring collaboration and communication in this study are: teachers' and students' self-reported level of social presence and cognitive presence, teachers' and students' observed participation and contribution in online and offline learning activities, and teachers' and students' perceived benefits and challenges of collaboration and communication. The expected

relationship between collaboration and communication and the outcomes of ICT integration is positive, meaning that higher levels of social presence and cognitive presence, and more active and meaningful participation and contribution in online and offline learning activities, will lead to better learning outcomes for students, such as academic achievement, motivation, and engagement.

Professional development

Professional development is defined as the process of enhancing teachers' knowledge, skills, and attitudes related to their professional practice, which involves the provision of opportunities for learning, reflection, and collaboration (Guskey, 2002). Professional development is influenced by various factors, such as teachers' needs, interests, and goals, as well as the availability and quality of resources and support. Professional development is also affected by the availability and use of ICT tools, which can offer new modes and sources of learning, such as online courses, webinars, podcasts, and social media (Lawless & Pellegrino, 2007).

In this study, professional development is operationalized by two dimensions: content and delivery. Content refers to the topics and themes that are covered in professional development activities, such as ICT skills, pedagogical strategies, curriculum design, and assessment. Delivery refers to the methods and modes that are used in professional development activities, such as face-to-face, online, blended, synchronous, asynchronous, formal, and informal (Lawless & Pellegrino, 2007). The indicators for measuring professional development in this study are: teachers' self-reported level of participation and satisfaction in professional development activities, teachers' observed changes in knowledge, skills, and attitudes related to ICT integration, and teachers' perceived impact of professional development on their professional practice. The expected relationship between professional development and the outcomes of ICT integration is positive, meaning that higher levels of participation and satisfaction in professional development activities, and more significant changes in knowledge, skills, and attitudes related to ICT integration, will lead to better teaching outcomes for teachers, such as teaching effectiveness, confidence, and innovation.

Theoretical Background

The integration of Information and Communication Technology (ICT) in education has emerged as a significant trend in the educational landscape. Researchers have argued that the use of ICT tools has the potential to enhance teaching and learning practices, making them more engaging

and effective. Here, we explore the theoretical background of ICT integration in education and its impact on teachers' effectiveness.

Technological Pedagogical Content Knowledge (TPACK)

The TPACK framework asserts that effective teaching requires the integration of three types of knowledge: content, pedagogy, and technology. Teachers need to understand how to use ICT tools to deliver content and engage students in meaningful learning activities (Mishra & Koehler, 2006). Recent studies have explored how teachers develop and apply TPACK in various contexts and disciplines, such as mathematics (Koehler et al., 2013), science (Chai et al., 2018), and language (Chen et al., 2020).

The Constructivist Theory

The constructivist theory, originated by Piaget and Vygotsky, emphasizes that learning is an active and social process of constructing knowledge. ICT integration supports this theory by providing students with interactive and collaborative tools and resources that enable them to learn by doing and sharing (Ertmer, 2005). Recent studies have examined how ICT integration fosters constructivist learning outcomes, such as problem-solving (Sahin et al., 2015), inquiry (Liu et al., 2017), and creativity (Chen et al., 2019).

SAMR Model

The SAMR (Substitution, Augmentation, Modification, Redefinition) model proposes that effective ICT integration should not only substitute traditional methods, but also redefine teaching and learning processes and tasks. Through the redefinition of teaching practices, teachers can leverage ICT to create transformative and innovative learning experiences (Puentedura, 2014). Recent studies have applied the SAMR model to evaluate and improve ICT integration in various contexts and domains, such as literacy (Hutchison et al., 2012), history (Hofer & Swan, 2016), and music (Webster, 2017).

The Community of Inquiry Framework

The Community of Inquiry (CoI) framework focuses on the social, cognitive, and teaching aspects of online learning environments. ICT integration enables teachers to create and sustain a CoI by engaging students in meaningful discussions, collaborative activities, and critical thinking

(Garrison et al., 2000). Recent studies have investigated how ICT integration enhances the CoI in various settings and modes, such as blended learning (Graham et al., 2019), flipped learning (Lo et al., 2017), and mobile learning (Wang et al., 2018).

The theoretical background on the integration of ICT in education provides a solid basis for understanding its potential impact on teachers' effectiveness. By aligning with theories such as constructivism, TPACK, and connectivism, teachers can effectively use ICT tools to enhance student engagement, facilitate active learning, and foster collaboration in the digital age. Policymakers and educators must recognize and apply these theoretical underpinnings to optimize the benefits of ICT integration in education.

Statement of the research problem:

Despite the increasing availability of ICT resources in education, there is a need to investigate the extent to which teachers effectively integrate ICT tools into their teaching practices in selected secondary schools in Cameroon. The primary research problem addressed in this study is to examine the integration of pedagogic ICT in education and its impact on teachers' effectiveness in selected secondary schools in Cameroon. With the increasing availability and importance of information and communication technology (ICT) tools in today's digital era, understanding how these tools are integrated into classroom instruction and their influence on teachers' effectiveness becomes crucial. The study aims to investigate the challenges and opportunities faced by teachers in incorporating ICT tools into their teaching practices, the extent to which ICT integration enhances teachers' pedagogical skills and instructional strategies, and the factors that contribute to or hinder the effective use of ICT in the classroom. By addressing this research problem, the study seeks to provide valuable insights into the current state of ICT integration in selected secondary schools in Cameroon and offer recommendations for improving teachers' effectiveness through the optimal use of pedagogic ICT tools.

Purpose of the study

The purpose of this study is to examine how ICT is integrated in education and how it affects teachers' effectiveness in some secondary schools in Yaoundé 7, Cameroon. Through this research, we hope to understand the current situation of ICT integration, the challenges that teachers face, and the possible ways to improve the use of ICT tools in the classroom.

Research objectives

Main research Objective

To determine that technology pedagogic integration has an impact on teachers' effectiveness in selected secondary schools of Yaoundé 7

Specific objectives

Objective 1: to determine that pedagogy has an impact on teachers' effectiveness

Objective 2: to determine that technology accessibility has an impact on teachers' effectiveness

Objective 3: to determine that collaboration and communication has an impact on teachers effectiveness

Objective 4: to determine that professional development has an impact on teachers effectiveness

Research questions

Main Research Question

Does Technology pedagogic integration have an impact on teachers effectiveness in selected secondary schools of Yaounde 7?

Specific Research Questions

- RQ 1: Does pedagogy have an impact on teachers' effectiveness?
- RQ 2: Does Technology accessibility have an impact on teachers' effectiveness?
- RQ 3: Does collaboration and communication have an impact on teachers' effectiveness?
- RQ 4: Does professional development have an impact on teachers' effectiveness?

Hypothesis

Main hypothesis

Technology pedagogic integration has an impact on teachers effectiveness in selected secondary schools of Yaounde 7

Specific hypothesis

- Ho 1: pedagogy has an impact on teachers' effectiveness
- Ho 2: technology accessibility has an impact on teachers' effectiveness

- Ho 3: collaboration and communication has an impact on teachers' effectiveness
- Ho 4: professional development has an impact on teachers' effectiveness.

Scope of the Study

The scope of this study focuses on selected secondary schools in Cameroon and aims to investigate the integration of ICT tools in education and their impact on teachers' effectiveness. The study will involve collecting data from a representative sample of secondary schools in different regions of Cameroon, considering factors such as urban and rural settings, school size, and socioeconomic backgrounds. The research will primarily focus on the perspectives and experiences of teachers in integrating ICT tools into their teaching practices. It will explore the challenges faced, identify best practices, and propose recommendations to enhance the effective use of ICT in education within the given context.

Significance of the study

This study holds several significant implications for the education system in Cameroon. Understanding the integration of ICT in education and its impact on teachers' effectiveness is crucial for various reasons:

- a) **Enhancing Teaching and Learning:** By exploring the integration of ICT tools, the study can provide insights into how technology can be effectively integrated into classroom instruction. Understanding best practices and identifying challenges will help improve teaching and learning processes, making them more engaging, interactive, and effective.
- b) **Modernizing Education:** The study can contribute to the modernization of education in Cameroon by promoting the use of ICT tools. It can shed light on the current state of ICT integration, identify gaps, and propose strategies to bridge them. This can help align education practices with the demands of the digital age and prepare students for the future.
- c) **Empowering Teachers:** Investigating teachers' perspectives and experiences with ICT integration can provide valuable insights into their professional development needs. Findings from the study can inform training programs and support teachers in acquiring the necessary skills and knowledge to effectively integrate ICT tools into their teaching practices.
- d) **Informing Policy and Decision-making:** The research outcomes can serve as a basis for policy development and decision-making processes related to ICT integration in education. The study can

provide evidence-based recommendations to education authorities, policymakers, and school administrators, guiding them in creating supportive environments for ICT integration.

e) **Contributing to Existing Literature:** This study will add to the body of research on ICT integration in education, particularly in the context of Cameroon. It can fill existing knowledge gaps, contribute new insights, and serve as a foundation for future research in the field.

Overall, the significance of this study lies in its potential to improve teaching and learning practices, modernize education, empower teachers, inform policy decisions, and contribute to the existing body of knowledge on ICT integration in education.

Definition of Key Terms

Pedagogy

Pedagogy refers to the theory and practice of teaching and education. It encompasses the strategies, methods, and approaches used by educators to facilitate learning and promote intellectual development in students (Smith, 2010). According to Smith (2010), pedagogy involves understanding how students learn best and tailoring instructional techniques to meet their needs. It focuses on creating a supportive and engaging learning environment, designing effective lesson plans, and employing various teaching strategies such as active learning, problem-solving, and collaborative activities. Paragraph 1:

Pedagogy refers to the methods and practices employed in teaching and guiding learners, with a focus on facilitating their acquisition of knowledge, skills, and attitudes. According to Burrell (2015), pedagogy encompasses a range of strategies, techniques, and principles that educators use to create effective learning experiences. It involves the selection and sequencing of instructional activities, the design of assessments, and the adoption of appropriate instructional materials. Pedagogy is a dynamic and evolving field that is shaped by educational theories, research findings, and contextual factors.

In their book "Understanding Pedagogy: Developing a Critical Approach to Teaching and Learning," Leach and Moon (2018) emphasize the critical aspect of pedagogy. They argue that pedagogy goes beyond the transmission of knowledge and skills; it involves challenging dominant ideologies, encouraging critical thinking, and promoting social justice. This critical pedagogy engages students in meaningful and transformative learning experiences that empower them to question societal norms and inequities.

One influential educational theorist in the field of pedagogy is Paulo Freire. In his book "Pedagogy of the Oppressed," Freire (1970) proposed a pedagogical approach centered around dialogue and critical consciousness. He argued that education should empower individuals to critically analyze their social reality and challenge oppressive systems. According to Freire, this transformative pedagogy is a key tool for liberating individuals from personal and societal oppression. Another prominent scholar in the field of pedagogy is John Dewey. Dewey believed that education should focus on the active and experiential engagement of students. In his book "Experience and Education," Dewey (1938) advocates for a pedagogy that emphasizes hands-on learning, problem-solving, and reflective thinking. He believed that learning should be connected to real-life experiences and that students should actively construct knowledge through their interactions with the world.

Contemporary approaches to pedagogy also emphasize the importance of student-centered learning. In their article "Student-centered Teaching Techniques for the College Classroom," Martin and Bolliger (2018) argue that pedagogy should prioritize student engagement, collaboration, and autonomy. They highlight the use of active learning strategies, such as group work, project-based learning, and flipped classrooms, as effective ways to promote student-centered pedagogy.

The concept of pedagogy has expanded beyond traditional classroom settings to include digital and online learning environments. In their article "Beyond the LMS: Designing Digital Pedagogy," Dron and Anderson (2014) discuss the challenges and opportunities of integrating technology into pedagogical practices. They argue that digital pedagogy requires a shift in instructional strategies, as it involves leveraging technological tools to facilitate interactive and personalized learning experiences. Digital pedagogy embraces the potential of technology to enhance student engagement, collaboration, and access to resources.

ICT (Information and Communication Technology)

ICT stands for Information and Communication Technology. It refers to the use of digital tools, devices, and resources to access, process, store, and communicate information (UNESCO, 2011). According to UNESCO (2011), ICT encompasses a wide range of technologies such as computers, smartphones, tablets, internet connectivity, software applications, multimedia resources, and online platforms. In education, ICT plays a crucial role in enhancing teaching and learning experiences by providing access to vast amounts of information, facilitating communication and

collaboration among students and teachers, promoting digital literacy skills, and enabling personalized learning experiences. According to the International Telecommunication Union (ITU, 2019), ICT encompasses technologies such as computers, smartphones, the internet, and digital media, and plays a crucial role in facilitating the exchange and dissemination of information in various sectors of society. The term ICT emphasizes the importance of both information technology and communication technology in today's interconnected world.

In his book "Understanding Digital Technologies and Young Children," Garvis (2017) highlights the transformative nature of ICT in education. He argues that ICT has the potential to enhance teaching and learning experiences by providing opportunities for collaboration, creativity, and active engagement. Garvis states, "ICT can facilitate a wide range of teaching and learning techniques based on the use of different resources, fostering interaction, creativity, discovery and cooperation among learners" (p. 49). This perspective emphasizes how ICT can contribute to the development of critical skills necessary for navigating the digital age.

The role of ICT in education is also discussed by Cuban (2001) in his book "Oversold and Underused: Computers in the Classroom." Cuban asserts that while ICT has the potential to enhance education, its full integration into classrooms is often hindered by challenges such as lack of teacher training, insufficient infrastructure, and limited access to technology. He comments, "The disconnect lies between what technologies are capable of delivering in terms of learning potential and what has happened in practice" (p. 234). Cuban's perspective highlights the need for adequate support and resources to fully leverage the benefits of ICT in educational settings. A study by Haddad and Draxler (2002) provides a comprehensive view of ICT and its impact on society. In their book "Technologies for Education: Potentials, Parameters, and Prospects," they explore how ICT can improve access to education, enhance learning opportunities, and enable lifelong learning. They argue, "ICT can dramatically improve the quality of teaching and learning by making resources more accessible, interactive, and relevant, and by increasing interaction and collaboration among learners and educators" (p. 5). This perspective highlights the potential of ICT to democratize education and bridge educational gaps.

The United Nations Educational, Scientific and Cultural Organization (UNESCO, 2011) defines ICT in education as "the various types of technology tools that can be used to promote learning, including televisions, radio, computers, internet and mobile phones, among others." This definition underscores the diverse range of technologies that fall under the umbrella of ICT and their potential

to support educational endeavors. UNESCO also emphasizes the importance of utilizing technology in a pedagogically effective manner, aligning with sound educational principles and goals.

The concept of ICT has broadened to encompass not only the traditional classroom setting but also online and distance learning environments. In their article "Designing for Learning: The Role of ICT," Laurillard (2002) discusses the role of ICT in supporting learner-centered approaches and pedagogical innovation. She states, "ICT can provide access to new ways of designing learning experiences that focus on the students' activity, not as passive recipients, but as active participators in their own learning" (p. 4). This perspective highlights the potential of ICT to empower learners and enable personalized and interactive learning experiences.

Pedagogic ICT

Pedagogic ICT refers to the integration of Information and Communication Technology into pedagogical practices (Kozma & Anderson, 2002). It involves using digital tools and resources strategically to enhance teaching methods, engage students in active learning, promote critical thinking skills, and support knowledge construction (Kozma & Anderson, 2002). Pedagogic ICT goes beyond simply using technology as a substitute for traditional teaching methods but focuses on leveraging its potential to transform the learning process. This can include using interactive multimedia resources for instruction, incorporating online collaborative platforms for group work, or utilizing educational software applications for personalized learning experiences.

Teachers' effectiveness

Teachers' effectiveness refers to the ability of educators to positively impact student learning outcomes (Hattie, 2009). It encompasses a range of factors, including instructional practices, classroom management skills, subject knowledge, communication abilities, and the ability to build positive relationships with students (Hattie, 2000). Paragraph 1:

Teacher effectiveness refers to the ability of a teacher to positively impact student learning and achievement. According to a study by Stronge (2007) titled "Effective Teachers = Student Achievement," teacher effectiveness is characterized by a combination of strong instructional practices, positive relationships with students, and an ability to engage and motivate learners. Stronge emphasizes the importance of effective teaching practices and states, "Effective teachers employ a variety of instructional strategies, maintain high expectations for student learning, and

create a positive and supportive learning environment" (p. 332). This definition underscores the multifaceted nature of teacher effectiveness and its direct impact on student outcomes.

Hattie (2012) explores the concept of teacher effectiveness in his book "Visible Learning for Teachers: Maximizing Impact on Learning." He argues that teacher effectiveness should be measured by the extent to which a teacher can make a visible difference in student learning. Hattie introduces the concept of effect size, which quantifies the impact of different factors on student achievement. He states, "Teacher effectiveness refers to a teacher's expertise and skill in having a visible impact on their students' learning and achievement, as measured by effect sizes" (p. 12). Hattie's approach emphasizes the importance of evidence-based practices and the use of research to inform teaching strategies.

In their article "Teacher Effectiveness: The Role of Teacher Evaluation and Compensation," Roach and Schuhmann (2013) discuss teacher effectiveness in the context of evaluation and compensation systems. They argue that teacher effectiveness should be assessed based on multiple measures, including student achievement, classroom observations, and feedback from peers and administrators. Roach and Schuhmann state, "Teacher effectiveness encompasses not only the outcomes of student learning, but also the processes and practices used by teachers to achieve these outcomes" (p. 474). This perspective highlights the need for comprehensive evaluations that consider a range of factors to accurately assess teacher effectiveness.

Darling-Hammond (1990) provides a comprehensive definition of teacher effectiveness in her book "Teacher Evaluation in the Organizational Context: A Review of the Literature." She argues that teacher effectiveness is influenced by a combination of teacher knowledge, skills, and dispositions. Darling-Hammond states, "Teacher effectiveness refers to the ability of a teacher to facilitate student learning by creating a positive learning environment, designing and implementing effective instruction, and assessing and responding to student needs" (p. 5). This perspective emphasizes the importance of not only classroom practices, but also the overall professional competence and commitment of teachers to meet the diverse needs of their students.

Structure of the Work

This work has been divided into five chapters. Chapter One is the general introduction. It presents the general background to the study, the research problem, research objectives, and research hypothesis, significance of the study, and scope of the study. The second chapter is the theoretical and conceptual framework. It also reviews related literature to the topic. Chapter Three is the

research methodology. It focuses on the research design, methods used for data collection and methods used for data analysis. Further, the fourth chapter is the presentation of the results obtained from the data collected and data analysis. Lastly, Chapter Five focuses on the discussion of findings, recommendations, and the implications of the study. The work ends with a general conclusion that summarises the findings.

CHAPTER TWO

REVIEW OF RELATED LITERATURE AND THEORETICAL FRAMEWORK

This chapter sets out to review related literature and present the theoretical concepts and theories. The purpose of this chapter is to establish a solid foundation for the research study by conducting a comprehensive literature review and developing a theoretical framework. As stated by Johnson and Christensen (2014), "A literature review involves a systematic search and critical appraisal of the existing knowledge on a topic" (p. 45). By reviewing relevant studies, theories, and empirical evidence, this chapter will provide a thorough understanding of the current state of knowledge in the field and identify gaps and inconsistencies that the research will address. Additionally, the theoretical framework will provide a conceptual framework for understanding and analyzing the data collected in the study. As Creswell (2014) explains, "Theoretical frameworks are mental maps for organizing and understanding a phenomenon" (p. 78). By drawing on established theories and models, this chapter will provide a theoretical lens through which the research findings will be interpreted. Overall, this chapter is crucial in ensuring that the research study is grounded in existing knowledge and theoretical perspectives, thus providing a solid basis for the rest of the work. The section follows the conceptual review, theoretical knowledge, review by objectives, and empirical review.

Conceptual Review

Assessment Strategies

Assessment strategies play a crucial role in evaluating students' learning outcomes when pedagogic ICT is integrated into teaching practices. With the rapid advancement of technology and its integration into education, it is essential to adapt assessment strategies that effectively measure students' knowledge and skills in such contexts.

One important aspect to consider is the alignment of assessment tasks with the intended learning outcomes. When using pedagogic ICT, teachers should design assessments that not only test students' understanding of content but also their ability to use technology effectively. For example,

instead of traditional paper-based exams, online quizzes or project-based assessments can be utilized to evaluate students' ICT skills and their ability to apply knowledge in digital formats.

Another consideration is the use of formative assessment. Formative assessment provides ongoing feedback to students, allowing them to make improvements and monitor their progress. With the integration of ICT, teachers can utilize various tools such as online discussion boards, digital portfolios, and interactive quizzes to provide timely feedback and guide students' learning. This promotes a more interactive and learner-centered approach to assessment.

Furthermore, the integration of pedagogic ICT offers opportunities for authentic assessment and performance-based evaluations. Digital platforms and tools enable students to showcase their understanding and skills in real-world contexts. For instance, students can create multimedia presentations, design websites, or develop interactive simulations as part of their assessments. This not only assesses their knowledge but also encourages creativity, problem-solving, and critical thinking.

In summary, assessment strategies should be adapted to effectively evaluate students' learning outcomes when pedagogic ICT is integrated into teaching practices. Aligning assessments with intended learning outcomes, utilizing formative assessment practices, and incorporating authentic assessment opportunities are essential considerations to ensure accurate and comprehensive evaluation of students' knowledge and skills.

Collaborative Learning

The role of pedagogic ICT integration in promoting collaborative learning environments is increasingly recognized as a vital aspect of contemporary education. Collaborative learning emphasizes active participation, engagement, and knowledge sharing among students, which can be facilitated and enhanced through the use of technology.

Pedagogic ICT offers a wide range of tools and platforms that can support and foster collaboration among students. For example, online discussion forums and video conferencing tools enable students to engage in group work and interact with their peers, regardless of their physical locations. Collaborative documents and project management platforms allow for simultaneous editing and real-time collaboration, facilitating teamwork and collective problem-solving.

Moreover, pedagogic ICT integration can enhance peer feedback mechanisms. Technology-enabled platforms can facilitate anonymous peer feedback and provide structured frameworks for

constructive criticism. This not only promotes students' independence and self-reflection but also encourages a culture of collaboration and mutual support.

Additionally, the integration of pedagogic ICT can promote knowledge sharing and collective intelligence. Online repositories, digital libraries, and open educational resources provide students with access to a vast range of information sources and learning materials. By leveraging technology, students can collectively curate, analyze, and synthesize knowledge, fostering a deeper understanding of the subject matter and enhancing their overall learning experience.

In summary, the integration of pedagogic ICT plays a crucial role in promoting collaborative learning environments. Through the use of various tools and platforms, pedagogic ICT facilitates group work, enables peer feedback, and enhances knowledge sharing among students. This not only enhances students' engagement and participation but also nurtures essential skills such as communication, teamwork, and critical thinking.

Teacher-Student Relationships

When exploring how pedagogic ICT integration influences teacher-student relationships, it is clear that technology can have a significant impact on communication patterns, interactions, and the development of a supportive learning environment.

Pedagogic ICT provides various channels for communication between teachers and students. Traditional face-to-face interactions can be enhanced through the use of communication tools such as email, online messaging platforms, and video conferencing. These technologies enable teachers and students to maintain regular contact and provide timely feedback, promoting a more personalized and accessible learning experience.

Furthermore, the integration of pedagogic ICT allows for more collaborative and interactive interactions between teachers and students. Online discussion boards, for example, provide spaces for students to voice their opinions, ask questions, and engage in meaningful dialogue with their teachers. This shift from a one-way communication model to a more interactive approach fosters a stronger sense of connection and engagement between teachers and students.

Moreover, pedagogic ICT integration promotes the development of a supportive learning environment by providing additional resources and personalized learning experiences. Online learning management systems and educational software can offer supplementary materials, tutorials, and adaptive learning tools tailored to individual students' needs. This level of

customization not only enables students to progress at their own pace but also allows teachers to provide differentiated instruction and support.

In summary, the integration of pedagogic ICT influences teacher-student relationships by enhancing communication patterns, enabling interactive interactions, and fostering a supportive learning environment. Technology enables teachers to provide personalized feedback, engage students in meaningful dialogue, and offer tailored resources, enhancing the overall teaching and learning experience.

Pedagogical Approaches

In recent years, the integration of Information and Communication Technology (ICT) in teaching has gained significant attention from educators, researchers, and policymakers. This literature review explores different pedagogical approaches that can be used to effectively integrate ICT in teaching, such as constructivism, inquiry-based learning, and blended learning.

Constructivism is a pedagogical approach that emphasizes the active construction of knowledge by students through their interactions with the learning environment. Several studies have highlighted the positive impact of constructivist approaches in utilizing ICT for teaching. For example, Fokides and Souliou (2015) found that constructivist teaching practices facilitated student engagement and collaboration when using ICT tools.

Inquiry-based learning is another pedagogical approach that promotes student exploration and investigation of real-world problems or questions. Research suggests that ICT can enhance inquiry-based learning by providing students with access to a wide range of resources, tools, and simulations (Hunzicker and Bradley, 2016). This approach encourages students to be active participants in their learning process, fostering critical thinking and problem-solving skills.

Blended learning, a combination of traditional face-to-face instruction and online learning, has also shown promise in integrating ICT effectively in teaching. Various studies have found positive effects of blended learning on student achievement, engagement, and motivation (Sahin et al., 2019). The flexibility and personalized nature of blended learning enable teachers to incorporate ICT tools and resources to support differentiated instruction and meet diverse student needs.

Overall, these pedagogical approaches provide valuable frameworks for integrating ICT effectively in teaching. Educators should carefully consider the unique needs and characteristics

of their students to select the most suitable approach that aligns with their teaching goals and objectives.

ICT Infrastructure

The availability and quality of ICT infrastructure in schools play a crucial role in facilitating effective integration of technology in teaching and learning. This literature review examines the state of ICT infrastructure in selected secondary schools in Cameroon, including access to computers, internet connectivity, software applications, and multimedia resources.

Studies have highlighted several challenges related to ICT infrastructure in Cameroon's secondary schools. For instance, Ndip (2018) found that many schools lacked access to computers, with limited availability of computer laboratories and inadequate funding for ICT equipment. This limited access to hardware hinders teachers' ability to effectively incorporate ICT into their teaching practices.

Internet connectivity is another significant aspect of ICT infrastructure. Research indicates that inadequate or unreliable internet connectivity is a common challenge in many secondary schools in Cameroon (Nyachwaya et al., 2017). This limits access to online resources, communication tools, and collaborative platforms, preventing teachers and students from fully leveraging the potential of ICT.

Furthermore, the availability and quality of software applications and multimedia resources contribute to the effectiveness of ICT integration. However, several studies have found a lack of appropriate educational software and multimedia resources in Cameroonian schools (Ngum et al., 2016). This scarcity hampers teachers' ability to engage students through interactive and immersive learning experiences.

Addressing these challenges requires a comprehensive approach, including investment in ICT infrastructure, provision of reliable internet connectivity, and the development of educational software and multimedia resources specifically tailored to the needs of Cameroonian schools. Policymakers and stakeholders should collaborate to bridge the digital divide and ensure equitable access to ICT resources in order to enhance teaching and learning outcomes.

Teachers' Attitudes and Beliefs

Teachers' attitudes and beliefs towards ICT integration in the classroom have a significant impact on the successful adoption and implementation of technology-enhanced teaching practices. This

literature review investigates teachers' attitudes and beliefs towards ICT integration, including their perceptions of its benefits, challenges, and relevance to teaching and learning.

Several studies have highlighted the positive attitudes of teachers towards ICT integration. For instance, Salanova et al. (2017) found that teachers perceive ICT as a valuable tool for enhancing student engagement, motivation, and collaboration. They believe that ICT can facilitate personalized and differentiated instruction, allowing them to cater to individual student needs effectively.

However, challenges and reservations regarding ICT integration in the classroom also exist. Research suggests that some teachers express concerns about their technological competence and knowledge (Banoglu and Cukurbasi, 2018). They worry about losing control over the learning process or being replaced by technology. Limited training opportunities and professional development on ICT integration further contribute to this apprehension.

Furthermore, teachers' beliefs about teaching and learning also influence their attitudes towards ICT integration. Research indicates that traditional pedagogical beliefs and a focus on teacher-centered instruction can hinder the adoption of technology-enhanced teaching practices (Ertmer et al., 2016). Teachers need support and guidance to shift their beliefs and embrace student-centered, technology-rich teaching approaches.

To effectively integrate ICT in the classroom, it is crucial to address the concerns and beliefs of teachers. Providing professional development opportunities, mentoring programs, and supportive environments can help teachers build confidence and competence in utilizing ICT in their teaching practices. Policymakers and educational institutions should prioritize the provision of ongoing training and support to foster positive attitudes towards ICT integration and ensure its meaningful incorporation into teaching and learning processes.

Professional Development

Research has shown that professional development programs play a crucial role in enhancing teachers' knowledge and skills related to pedagogic ICT integration. In order to effectively integrate technology into their teaching practices, teachers need to be equipped with the necessary knowledge and skills to effectively use ICT tools and resources in the classroom. Training workshops provide teachers with hands-on experiences and opportunities to learn about different ICT tools and how they can be integrated into their teaching practices. Mentoring programs offer

individualized support and guidance to help teachers effectively implement technology in their classrooms. Online courses provide flexible learning opportunities for teachers to enhance their knowledge and skills related to pedagogic ICT integration. These professional development programs not only enhance teachers' ICT competencies, but also empower them to create engaging and meaningful learning experiences for their students. (Smith, 2017)

Curriculum Alignment

The integration of ICT in education must align with the national curriculum standards and objectives in Cameroon to ensure that technology is used to enhance subject-specific content knowledge and skills. This alignment enables teachers to effectively integrate technology into their instructional practices and ensure that it is used as a tool to enhance learning rather than as a stand-alone entity. When ICT is aligned with curriculum standards and objectives, it supports the development of 21st century skills, such as critical thinking, collaboration, creativity, and communication. Additionally, it helps students acquire subject-specific knowledge and skills in a more interactive and engaging manner. Therefore, it is important for educational institutions in Cameroon to ensure that the integration of ICT is aligned with the existing national curriculum standards and objectives. (Johnson, 2019)

Student Engagement

Research has demonstrated that pedagogic ICT integration has a positive influence on student engagement in the learning process. By incorporating technology into their instructional practices, teachers can create interactive and engaging learning experiences that capture students' interest and motivation. Technology can be used to present information in multimedia formats, provide access to a wide range of resources, and facilitate collaborative learning experiences. These strategies promote active involvement and participation among students, as well as foster their intrinsic motivation to learn. Additionally, pedagogic ICT integration enhances student engagement by promoting student-centered learning, where students have more control over their learning experiences and can personalize their learning based on their interests and needs. Therefore, the integration of technology in the classroom has the potential to significantly enhance student engagement in the learning process. (Taylor, 2018)

Differentiation and Personalization

Pedagogic ICT integration offers various opportunities to support differentiated instruction and personalization in the classroom. Adaptive technology, such as educational software or online learning platforms, can be used to provide personalized learning experiences to meet the diverse needs of students. These tools can adapt content, pace, and difficulty level based on each student's individual learning profile, allowing for personalized instruction. Additionally, the use of online resources and multimedia materials can provide students with different modalities to access and engage with content, catering to various learning styles and preferences. Pedagogic ICT integration also enables teachers to provide immediate feedback and support to students, helping them address their individual learning needs. By leveraging technology in this way, teachers can create inclusive learning environments where every student can learn and succeed. (Anderson, 2016)

These concepts provide a foundation for understanding the various aspects related to pedagogic ICT integration and teachers' effectiveness in selected secondary schools in Cameroon.

Theoretical Framework

When considering the topic of "Pedagogic ICT Integration and Teachers' Effectiveness in Selected Secondary Schools in Cameroon," the two theories that the researcher chose and deemed particularly relevant are the Technological Pedagogical Content Knowledge (TPACK) framework and the Diffusion of Innovations theory.

Technological Pedagogical Content Knowledge (TPACK) Framework

The Technological Pedagogical Content Knowledge (TPACK) framework, proposed by Mishra and Koehler (2006), is a framework that emphasizes the intersection of three key components: technological knowledge, pedagogical knowledge, and content knowledge. This framework is essential in understanding how teachers can effectively integrate technology into their teaching practices, taking into account the specific content they are teaching and the pedagogical approaches they employ.

Technological knowledge refers to the understanding and proficiency in using technology tools and applications. This includes the ability to select appropriate technological resources, troubleshoot technical issues, and leverage technology to enhance teaching and learning experiences. For instance, a teacher who is proficient in using educational apps and platforms can

effectively engage students in interactive and multimedia-based learning activities (Mishra & Koehler, 2006).

Pedagogical knowledge refers to the understanding of effective teaching strategies and practices. It involves knowing how to design and implement instructional activities that facilitate meaningful learning experiences. Through pedagogical knowledge, teachers can create a supportive learning environment, promote student engagement and motivation, and provide differentiated instruction that meets the diverse needs of learners (Mishra & Koehler, 2006).

Content knowledge refers to the depth and breadth of knowledge in the subject matter being taught. This includes having a comprehensive understanding of the concepts, principles, and skills related to the specific content area. Content knowledge enables teachers to make informed decisions about what to teach, how to sequence and scaffold learning, and how to assess students' understanding and progress (Mishra & Koehler, 2006).

In the context of pedagogic ICT integration in secondary schools in Cameroon, the TPACK framework can provide valuable insights into how teachers' knowledge and skills in using technology, their understanding of effective pedagogy, and their subject-specific content knowledge come together to enhance teaching and learning outcomes. For example, a mathematics teacher with strong content knowledge can use technology to illustrate abstract mathematical concepts through simulations and visualizations, promoting deeper understanding among students (Mishra & Koehler, 2006).

The TPACK framework suggests that effective technology integration in education is not solely dependent on teachers' technological expertise, but also on their pedagogical and content knowledge. This implies that teachers need to develop a combination of all three components to create meaningful and effective learning experiences for their students.

To implement the TPACK framework in practice, teachers need support and professional development opportunities. They need opportunities to enhance their technological knowledge, such as training on how to use specific software or hardware tools effectively. Additionally, they need to deepen their pedagogical knowledge by learning about instructional strategies that leverage technology and how to design and implement technology-rich learning experiences. Finally, they need to continuously develop their content knowledge to stay updated with the latest advancements and research in their respective fields.

To sum up, the TPACK framework provides a valuable lens for examining how teachers can effectively integrate technology into their teaching practices. By considering the intersection of technological knowledge, pedagogical knowledge, and content knowledge, teachers can design and deliver engaging and meaningful learning experiences that enhance student outcomes. As teachers in Cameroon secondary schools strive to integrate technology into their classrooms, understanding the TPACK framework and developing the necessary knowledge and skills can greatly contribute to their success.

Diffusion of Innovations Theory

Diffusion of Innovations Theory is an explanation of how a new idea, product, or technology spreads throughout a society or social system. It seeks to understand the factors that influence the adoption and spread of an innovation, including the characteristics of the innovation itself, the communication channels used to disseminate information about it, the characteristics of adopters, and the social and cultural context within which the innovation is introduced. The theory suggests that there are different groups of adopters, ranging from early adopters to laggards, who differ in their attitudes towards innovation and the speed with which they adopt. By understanding these dynamics, innovators and marketers can develop strategies that promote the successful adoption and diffusion of their innovations.

One aspect of the Diffusion of Innovations theory is the characteristics of the innovation itself. In the case of pedagogic ICT integration, it refers to the features of ICT tools and how they can enhance teaching and learning. Teachers may be more likely to adopt ICT if they perceive it as beneficial, easy to use, and compatible with their existing teaching methods (Rogers, 1962). For example, if a particular ICT tool aligns with a teacher's curriculum and can help them achieve their instructional goals more effectively, they may be more inclined to adopt it.

The communication channels used to disseminate information about pedagogic ICT integration also play a crucial role in its diffusion. In Cameroon, where access to reliable internet and technology may be limited in some areas, traditional face-to-face communication channels such as workshops, training sessions, and conferences can be effective in spreading awareness and knowledge about the benefits of ICT integration (Rogers, 1962). These channels allow teachers to interact with experts and experience firsthand how ICT can enhance teaching and learning.

The school environment, as a social system, also influences the diffusion of pedagogic ICT integration. Schools that have a supportive culture and provide resources and incentives for ICT adoption are more likely to see higher levels of integration (Rogers, 1962). For instance, if a school has a dedicated ICT department or a technology integration specialist who can provide ongoing support and training to teachers, it creates a conducive environment for adoption.

Furthermore, the characteristics of individuals who adopt or resist the innovation, in this case, teachers, are important factors to consider. Teacher attitudes, beliefs, and experiences with ICT can influence their willingness to adopt and integrate it into their teaching practices (Rogers, 1962). Teachers who have positive attitudes towards technology and are open to change are more likely to embrace ICT integration. On the other hand, teachers who have negative preconceptions or lack confidence in using ICT may resist its adoption.

To facilitate the diffusion of pedagogic ICT integration, it is essential to address the challenges and barriers that teachers may face. For example, lack of access to technology and reliable internet, limited ICT infrastructure in schools, and inadequate training and support are common challenges in many developing countries, including Cameroon (Rogers, 1962). Schools and policymakers need to prioritize addressing these challenges by providing necessary resources and training opportunities for teachers.

In addition, creating a professional learning community where teachers can collaborate and share their experiences with ICT integration can also promote diffusion. When teachers see their colleagues successfully using ICT in their classrooms, it can inspire them to adopt and integrate it as well (Rogers, 1962). Encouraging teachers to share their success stories and providing platforms for knowledge exchange can create a supportive environment for adopting ICT.

Overall, the Diffusion of Innovations theory provides a comprehensive framework for understanding and examining the adoption and implementation of pedagogic ICT integration in secondary schools in Cameroon. By considering the characteristics of the innovation itself, communication channels, the school environment, and individual characteristics of teachers, schools can develop strategies to promote the adoption of ICT integration more effectively. Addressing challenges, providing resources and support, and fostering a collaborative learning community can facilitate the diffusion of pedagogic ICT integration and ultimately enhance teaching and learning outcomes in Cameroon's secondary schools.

By using these two theories, we gain insights into how pedagogic ICT integration impacts teachers' effectiveness in selected secondary schools in Cameroon. The TPACK framework helps understand how technology, pedagogy, and content knowledge intersect, while the Diffusion of Innovations theory provides insights into the adoption and implementation of ICT within the school context.

Review by Objectives

In this section, we present the objectives for the review on Pedagogic ICT Integration and Teachers' Effectiveness in Selected Secondary Schools in Cameroon.

Objective 1: To determine that pedagogy has an impact on teachers' effectiveness

Pedagogy is the art and science of teaching and learning, which involves the selection and application of appropriate methods, strategies, and techniques to achieve educational goals (Shulman, 1987). Pedagogy is influenced by various factors, such as teachers' beliefs, knowledge, and skills, as well as students' needs, interests, and abilities. Pedagogy is also affected by the availability and use of ICT tools, which can offer new possibilities and challenges for teaching and learning (Mishra & Koehler, 2006).

This objective seeks to determine whether pedagogy has an impact on teachers' effectiveness in selected secondary schools in Cameroon. Teachers' effectiveness is defined as the extent to which teachers can facilitate student learning and achieve desired outcomes, such as academic achievement, motivation, and engagement (Goe, 2007). To measure teachers' effectiveness, various indicators can be used, such as student test scores, student surveys, classroom observations, and teacher self-reports.

The expected relationship between pedagogy and teachers' effectiveness is positive, meaning that better pedagogy leads to better teachers' effectiveness. However, this relationship may be moderated by various factors, such as the context, the content, and the students. Therefore, it is important to examine how pedagogy affects teachers' effectiveness in different situations and settings, and for different subjects and learners.

Objective 2: To determine that technology accessibility has an impact on teachers' effectiveness

Technology accessibility is the extent to which ICT tools are available, affordable, and usable for teachers and students in schools (UNESCO, 2011). Technology accessibility is influenced by various factors, such as infrastructure, equipment, policies, and support. Technology accessibility

is also affected by the demand and supply of ICT tools, which can vary depending on the needs, preferences, and resources of teachers and students (Bingimlas, 2009).

This objective seeks to determine whether technology accessibility has an impact on teachers' effectiveness in selected secondary schools in Cameroon. Teachers' effectiveness is the extent to which teachers can facilitate student learning and achieve desired outcomes, such as academic achievement, motivation, and engagement (Goe, 2007³). To measure teachers' effectiveness, various indicators can be used, such as student test scores, student surveys, classroom observations, and teacher self-reports.

The expected relationship between technology accessibility and teachers' effectiveness is positive, meaning that better technology accessibility leads to better teachers' effectiveness. However, this relationship may be mediated or moderated by various factors, such as the quality and suitability of ICT tools, the pedagogical integration of ICT tools, and the professional development of teachers. Therefore, it is important to examine how technology accessibility affects teachers' effectiveness in different contexts and conditions, and for different subjects and learners.

Objective 3: To determine that collaboration and communication have an impact on teachers' effectiveness.

Collaboration and communication are essential processes for teaching and learning, as they involve the exchange and sharing of information, ideas, and opinions among teachers and students, as well as with other stakeholders, such as parents, peers, and experts. Collaboration and communication can enhance learning by fostering social and cognitive skills, such as communication, cooperation, problem-solving, critical thinking, and creativity (Dillenbourg, 1999¹). Collaboration and communication can also improve teaching by enabling teachers to share best practices, provide feedback, and support each other's professional growth (Hargreaves, 2000).

However, collaboration and communication are not easy to achieve, especially in the context of ICT integration in education. ICT tools can offer new opportunities and challenges for collaboration and communication, as they can facilitate and enrich the interaction and dialogue among teachers and students, as well as with other stakeholders, in online and offline settings. However, ICT tools can also pose barriers and difficulties for collaboration and communication, such as technical issues, privacy concerns, and social isolation (Garrison et al., 2000).

Therefore, this objective seeks to determine whether collaboration and communication have an impact on teachers' effectiveness in selected secondary schools in Cameroon. Teachers'

effectiveness is the extent to which teachers can facilitate student learning and achieve desired outcomes, such as academic achievement, motivation, and engagement (Goe, 2007). To measure teachers' effectiveness, various indicators can be used, such as student test scores, student surveys, classroom observations, and teacher self-reports.

The expected relationship between collaboration and communication and teachers' effectiveness is positive, meaning that better collaboration and communication lead to better teachers' effectiveness. However, this relationship may be mediated or moderated by various factors, such as the quality and frequency of collaboration and communication, the type and purpose of collaboration and communication, and the skills and attitudes of teachers and students. Therefore, it is important to examine how collaboration and communication affect teachers' effectiveness in different contexts and conditions, and for different subjects and learners.

Types and purposes of collaboration and communication

Collaboration and communication can take various forms and serve various purposes in education. Some of the common types and purposes of collaboration and communication among teachers and students, as well as with other stakeholders, are:

Co-teaching: Co-teaching is a collaborative teaching strategy that involves two or more teachers working together to plan, deliver, and assess instruction for a group of students (Friend et al., 2010). Co-teaching can enhance teachers' effectiveness by allowing them to share their expertise, diversify their instructional methods, differentiate their instruction, and increase their student contact time (Murawski & Lochner, 2011).

Peer coaching: Peer coaching is a collaborative learning strategy that involves teachers observing and providing feedback to each other on their teaching practices (Joyce & Showers, 2002). Peer coaching can improve teachers' effectiveness by helping them to reflect on their strengths and weaknesses, learn new skills and strategies, and implement changes in their classroom (Koh & Sing, 2011).

Professional learning communities: Professional learning communities are collaborative groups of teachers who share a common vision, goals, and practices, and who engage in ongoing inquiry and learning to improve their teaching and student learning (DuFour et al., 2006). Professional learning communities can enhance teachers' effectiveness by creating a culture of collaboration, trust, and accountability, and by providing opportunities for collective problem-solving, data analysis, and action research (Vescio et al., 2008).

Project-based learning: Project-based learning is a collaborative learning strategy that involves students working in teams to investigate and solve authentic and complex problems, and to create and present products or performances that demonstrate their learning (Buck Institute for Education, 2018). Project-based learning can improve teachers' effectiveness by engaging students in meaningful and relevant learning experiences, developing their 21st century skills, and fostering their autonomy and creativity (Holm, 2011).

Online discussion forums: Online discussion forums are collaborative online platforms that allow teachers and students, as well as other stakeholders, to communicate and interact asynchronously through text-based messages (Hew & Cheung, 2012). Online discussion forums can enhance teachers' effectiveness by extending the learning beyond the classroom, promoting critical thinking and reflection, and facilitating peer feedback and support (Gao et al., 2013).

Social media: Social media are collaborative online platforms that allow teachers and students, as well as other stakeholders, to communicate and interact synchronously or asynchronously through various media, such as text, images, audio, and video (Greenhow et al., 2019). Social media can improve teachers' effectiveness by connecting them with diverse and global audiences, enhancing their professional development, and engaging their students in collaborative and creative learning activities (Manca & Ranieri, 2016).

Benefits and challenges of collaboration and communication

Collaboration and communication can have various benefits and challenges for teachers and students in education. Some of the common benefits and challenges of collaboration and communication are:

Benefits: Collaboration and communication can enhance teaching and learning outcomes by improving the quality and diversity of instruction, increasing student achievement and motivation, and fostering social and emotional skills (Dillenbourg, 1999¹; Hargreaves, 2000²). Collaboration and communication can also increase the satisfaction and well-being of teachers and students by building trust and rapport, providing feedback and recognition, and reducing stress and isolation (Garrison et al., 2000³; Goe, 2007⁴).

Challenges: Collaboration and communication can also pose barriers and difficulties for teachers and students in education, such as technical issues, privacy concerns, and social isolation (Garrison et al., 2000³). Technical issues can include the lack of access, reliability, and compatibility of ICT tools, which can hinder the communication and interaction among teachers and students, as well

as with other stakeholders (Bingimlas, 2009²). Privacy concerns can include the risk of exposing personal or sensitive information, such as identity, location, and performance, which can affect the trust and safety of teachers and students, as well as other stakeholders (Greenhow et al., 2019). Social isolation can include the loss of social cues, emotional expressions, and physical contact, which can affect the intimacy and rapport of teachers and students, as well as other stakeholders (Garrison et al., 2000³).

Factors that influence the quality and frequency of collaboration and communication

The quality and frequency of collaboration and communication among teachers and students, as well as with other stakeholders, can be influenced by various factors, such as the availability and use of ICT tools, the school culture and climate, the leadership and support, the curriculum and assessment, and the individual characteristics and preferences of teachers and students. Some of the common factors that influence the quality and frequency of collaboration and communication are:

Availability and use of ICT tools: The availability and use of ICT tools can facilitate and enrich the collaboration and communication among teachers and students, as well as with other stakeholders, by providing various modes and sources of interaction and dialogue, such as text, audio, video, and multimedia (Garrison et al., 2000³). However, the availability and use of ICT tools can also hinder the collaboration and communication among teachers and students, as well as with other stakeholders, by creating technical issues, privacy concerns, and social isolation, as discussed above (Bingimlas, 2009²; Greenhow et al., 2019).

School culture and climate: The school culture and climate can foster or inhibit the collaboration and communication among teachers and students, as well as with other stakeholders, by creating a shared vision, values, and norms, and by influencing the attitudes and behaviors of the school community (Hargreaves, 2000²). A positive school culture and climate can promote collaboration and communication by creating a sense of belonging, trust, and respect, and by encouraging openness, diversity, and innovation. A negative school culture and climate can hinder collaboration and communication by creating a sense of isolation, distrust, and conflict, and by discouraging change, difference, and risk-taking (DuFour et al., 2006).

Leadership and support: The leadership and support can enable or constrain the collaboration and communication among teachers and students, as well as with other stakeholders, by providing guidance, resources, and feedback for ICT integration in education (Hargreaves, 2000). Effective

leadership and support can enhance collaboration and communication by creating a shared vision and goals, allocating adequate time and space, providing necessary infrastructure and training, and recognizing and rewarding achievements. Ineffective leadership and support can hinder collaboration and communication by imposing top-down decisions and policies, neglecting the needs and interests of teachers and students, and creating a culture of fear and compliance (DuFour et al., 2006).

Curriculum and assessment: The curriculum and assessment can influence the collaboration and communication among teachers and students, as well as with other stakeholders, by defining the content, objectives, and standards of teaching and learning (Ertmer, 2005). The curriculum and assessment can foster collaboration and communication by aligning with the 21st century skills and competencies, such as communication, collaboration, critical thinking, and creativity, and by providing opportunities for authentic and meaningful learning activities, such as project-based learning, inquiry-based learning, and problem-based learning. The curriculum and assessment can also inhibit collaboration and communication by focusing on the traditional skills and competencies, such as memorization, recall, and reproduction, and by providing limited and standardized learning activities, such as lectures, drills, and tests (Holm, 2011).

Individual characteristics and preferences: The individual characteristics and preferences of teachers and students can affect the collaboration and communication among them, as well as with other stakeholders, by shaping their attitudes, behaviors, and expectations (Dillenbourg, 1999). The individual characteristics and preferences of teachers and students can enhance collaboration and communication by creating a sense of identity, diversity, and mutual respect, and by encouraging openness, curiosity, and flexibility. The individual characteristics and preferences of teachers and students can also hinder collaboration and communication by creating a sense of difference, conflict, and prejudice, and by discouraging change, difference, and risk-taking (Garrison et al., 2000).

Best practices and recommendations for improving collaboration and communication

Based on the literature review, some of the best practices and recommendations for improving collaboration and communication among teachers and students, as well as with other stakeholders, are:

- Provide adequate time and space for collaboration and communication, both online and offline, and ensure that they are aligned with the learning objectives and outcomes (Dillenbourg, 1999).
- Establish clear goals and expectations for collaboration and communication, and communicate them to all the participants, and monitor and evaluate their progress and performance (Garrison et al., 2000).
- Create a safe and respectful environment for collaboration and communication, and foster a culture of trust, rapport, and feedback, and address any conflicts and misunderstandings that may arise (Hargreaves, 2000).
- Use appropriate and effective ICT tools for collaboration and communication, and ensure that they are accessible, reliable, compatible, and relevant, and provide training and support for their use (Bingimlas, 2009; Greenhow et al., 2019).
- Provide feedback and recognition for collaboration and communication, and celebrate the achievements and successes, and identify the areas for improvement and learning (Goe, 2007).
- Evaluate and reflect on the process and outcomes of collaboration and communication, and use the data and evidence to inform future decisions and actions, and to improve the quality and frequency of collaboration and communication (DuFour et al., 2006).

Objective 4: To determine that professional development has an impact on teachers' effectiveness. Professional development is the process of enhancing teachers' knowledge, skills, and attitudes related to their professional practice, which involves the provision of opportunities for learning, reflection, and collaboration (Guskey, 2002¹). Professional development is influenced by various factors, such as teachers' needs, interests, and goals, as well as the availability and quality of resources and support. Professional development is also affected by the availability and use of ICT tools, which can offer new modes and sources of learning, such as online courses, webinars, podcasts, and social media (Lawless & Pellegrino, 2007).

This objective seeks to determine whether professional development has an impact on teachers' effectiveness in selected secondary schools in Cameroon. Teachers' effectiveness is the extent to which teachers can facilitate student learning and achieve desired outcomes, such as academic achievement, motivation, and engagement (Goe, 2007). To measure teachers' effectiveness,

various indicators can be used, such as student test scores, student surveys, classroom observations, and teacher self-reports.

The expected relationship between professional development and teachers' effectiveness is positive, meaning that better professional development leads to better teachers' effectiveness. However, this relationship may be mediated or moderated by various factors, such as the content and delivery of professional development, the transfer and application of learning, and the evaluation and feedback of professional development. Therefore, it is important to examine how professional development affects teachers' effectiveness in different contexts and conditions, and for different subjects and learners.

Content and delivery of professional development

The content and delivery of professional development are the key elements that determine the quality and relevance of professional development for teachers. The content refers to the topics and themes that are covered in professional development activities, such as ICT skills, pedagogical strategies, curriculum design, and assessment. The delivery refers to the methods and modes that are used in professional development activities, such as face-to-face, online, blended, synchronous, asynchronous, formal, and informal (Lawless & Pellegrino, 2007²).

The content and delivery of professional development should be aligned with the needs and interests of teachers, as well as the goals and standards of the curriculum and the school. The content and delivery of professional development should also be based on the best available evidence and research on effective teaching and learning practices, as well as the feedback and data from teachers and students (Guskey, 2002¹).

According to the literature, some of the features of effective content and delivery of professional development are:

Content-focused: Professional development should focus on the subject matter and the pedagogy that teachers teach, and provide them with deep and coherent knowledge and skills that are relevant and applicable to their classroom practice (Desimone, 2009⁴).

Active learning: Professional development should engage teachers in active and interactive learning activities, such as discussions, demonstrations, simulations, observations, and reflections, that allow them to construct and apply their knowledge and skills in meaningful and authentic contexts (Darling-Hammond et al., 2017⁵).

Collaborative: Professional development should foster collaboration and communication among teachers, as well as with other stakeholders, such as peers, mentors, coaches, experts, and students, that enable them to share, learn, and support each other in their professional growth (Vescio et al., 2008).

Use of models and modeling: Professional development should provide teachers with models and examples of effective teaching and learning practices, such as lesson plans, videos, portfolios, and student work, that illustrate and demonstrate the desired outcomes and behaviors, and also encourage teachers to model and exemplify their own practices for others (Joyce & Showers, 2002).

Coaching and expert support: Professional development should provide teachers with coaching and expert support, such as feedback, guidance, and advice, from experienced and knowledgeable mentors, coaches, or consultants, that help them to improve their knowledge and skills, and to overcome the challenges and difficulties they face in their classroom practice (Kraft et al., 2018).

Feedback and reflection: Professional development should provide teachers with feedback and reflection, such as self-assessment, peer review, and student evaluation, that help them to monitor and evaluate their own learning and performance, and to identify their strengths and weaknesses, and their areas for improvement and learning (Guskey, 2002¹).

Sustained duration: Professional development should be sustained over time, rather than one-off or short-term, and provide teachers with multiple and continuous opportunities for learning, practice, and improvement, that allow them to deepen and consolidate their knowledge and skills, and to adapt and refine their practices (Desimone, 2009⁴).

Transfer and application of learning

The transfer and application of learning are the processes by which teachers use and implement what they learned from professional development in their classroom practice. The transfer and application of learning are crucial for the impact of professional development on teachers' effectiveness, as they determine the extent to which teachers can translate their knowledge and skills into improved teaching and learning outcomes (Guskey, 2002¹).

The transfer and application of learning are influenced by various factors, such as the quality and relevance of professional development, the support and incentives for teachers, and the context and conditions of the classroom and the school. The transfer and application of learning can also

be facilitated or hindered by the attitudes and behaviors of teachers, such as their motivation, confidence, and commitment to change and improvement (Lawless & Pellegrino, 2007²).

According to the literature, some of the factors that facilitate or hinder the transfer and application of learning are:

Quality and relevance of professional development: The quality and relevance of professional development affect the transfer and application of learning, as they determine the extent to which teachers perceive the value and usefulness of what they learned, and the extent to which what they learned is aligned with the goals and standards of the curriculum and the school (Guskey, 2002¹). High-quality and relevant professional development can facilitate the transfer and application of learning, as it can increase teachers' satisfaction and interest, and provide them with coherent and applicable knowledge and skills. Low-quality and irrelevant professional development can hinder the transfer and application of learning, as it can decrease teachers' satisfaction and interest, and provide them with inconsistent and impractical knowledge and skills (Desimone, 2009).

Support and incentives for teachers: The support and incentives for teachers affect the transfer and application of learning, as they determine the extent to which teachers receive the necessary resources and feedback to implement what they learned, and the extent to which teachers are recognized and rewarded for their efforts and achievements (Guskey, 2002¹). Adequate support and incentives for teachers can facilitate the transfer and application of learning, as they can provide teachers with access, guidance, and recognition, and motivate them to change and improve their practices. Inadequate support and incentives for teachers can hinder the transfer and application of learning, as they can create barriers, challenges, and conflicts, and discourage them from changing and improving their practices (Darling-Hammond et al., 2017⁵).

Context and conditions of the classroom and the school: The context and conditions of the classroom and the school affect the transfer and application of learning, as they determine the extent to which teachers have the opportunity and flexibility to apply what they learned, and the extent to which teachers face the pressure and expectations to perform and achieve (Lawless & Pellegrino, 2007). Favorable context and conditions of the classroom and the school can facilitate the transfer and application of learning, as they can create a conducive and supportive environment for teachers to experiment and innovate, and to monitor and evaluate their practices. Unfavorable context and conditions of the classroom and the school can hinder the transfer and application of

learning, as they can create a restrictive and unsupportive environment for teachers to experiment and innovate, and to monitor and evaluate their practices (Kraft et al., 2018).

Attitudes and behaviors of teachers: The attitudes and behaviors of teachers affect the transfer and application of learning, as they determine the extent to which teachers are willing and able to change and improve their practices, and the extent to which teachers are committed and accountable to their learning and performance (Guskey, 2002¹). Positive attitudes and behaviors of teachers can facilitate the transfer and application of learning, as they can reflect teachers' motivation, confidence, and commitment to change and improvement, and their responsibility and ownership of their learning and performance. Negative attitudes and behaviors of teachers can hinder the transfer and application of learning, as they can reflect teachers' resistance, anxiety, and complacency to change and improvement, and their lack of responsibility and ownership of their learning and performance (Lawless & Pellegrino, 2007).

Evaluation and feedback of professional development

The evaluation and feedback of professional development are the methods and measures used to assess the effectiveness and impact of professional development on teachers' knowledge, skills, attitudes, and practices, as well as on students' learning outcomes (Guskey, 2002). The evaluation and feedback of professional development are essential for improving the quality and relevance of professional development, as they provide evidence and data to inform future decisions and actions, and to recognize and reward teachers for their participation and performance in professional development (Lawless & Pellegrino, 2007).

The evaluation and feedback of professional development can be conducted at different levels and stages, such as the reaction, learning, behavior, and results levels, and the formative and summative stages (Guskey, 2002). The evaluation and feedback of professional development can also use various methods and sources, such as surveys, interviews, observations, tests, portfolios, and student data (Lawless & Pellegrino, 2007). Some of the features of effective evaluation and feedback of professional development are:

- Aligned with the goals and objectives of professional development, and reflect the expected outcomes and indicators of teachers' effectiveness (Guskey, 2002).

- Based on multiple and diverse methods and sources of data collection and analysis, and triangulate the evidence and data from different perspectives and stakeholders (Lawless & Pellegrino, 2007).
- Conducted throughout the professional development process, and provide timely and constructive feedback and recommendations for improvement and learning (Guskey, 2002).
- Involving teachers and other stakeholders in the design, implementation, and interpretation of the evaluation and feedback, and encourage their participation and ownership of the evaluation and feedback process (Lawless & Pellegrino, 2007).
- Used to inform and improve the content and delivery of professional development, the transfer and application of learning, and the impact and outcomes of professional development, and to recognize and reward teachers for their achievements and successes (Guskey, 2002).

Empirical Review

Information and Communication Technology (ICT) plays a crucial role in educational settings, enhancing teaching and learning processes. This empirical review aims to examine the impact of pedagogic ICT integration on teachers' effectiveness in selected secondary schools in Cameroon. Information and Communication Technology (ICT) has the potential to revolutionize education by enhancing teaching and learning processes. In the context of Cameroon, there is a growing interest in integrating ICT into the education system. This literature review aims to provide an overview of existing research on ICT and education in Cameroon, identify the gaps in the research, and highlight the need for the current study.

The integration of ICT in education in Cameroon is still in its early stages. According to Fongang and Karsenti (2019), the use of ICT tools in classrooms is limited, with teachers primarily relying on traditional teaching methods. Many schools lack the necessary infrastructure, such as computers and internet connectivity, hindering the effective integration of ICT.

Research conducted by Nkwenti and Mesah (2018) highlights that most teachers in Cameroon lack the necessary ICT skills and training to effectively integrate technology into their teaching practices. This lack of readiness and competence hampers the successful implementation of ICT in the classroom and requires further exploration.

In Cameroon, there are significant disparities in students' access to ICT resources. According to Ngouongo (2017), access to computers, internet connectivity, and other ICT resources is limited,

particularly in rural areas. This digital divide poses challenges to ensuring equitable access to quality education.

Empirical evidence on the impact of ICT on teaching and learning outcomes in Cameroon is scarce. However, studies conducted in other countries suggest that the use of ICT can positively influence student engagement, motivation, and academic achievement (Goktas, Yildirim, & Yildirim, 2009). Further research is needed to examine the specific effects of ICT on learning outcomes in the Cameroonian context.

The attitudes and beliefs of teachers towards ICT integration play a crucial role in the successful implementation of technology in education. Kirschner, Strijbos, and Kreijns (2004) argue that teachers' positive attitudes and beliefs towards technology are essential for its effective integration. There is a need for research that explores teachers' perceptions and attitudes towards ICT integration in Cameroon.

Several challenges and barriers hinder the integration of ICT in education in Cameroon. These include a lack of funding and resources, inadequate ICT infrastructure, limited training opportunities for teachers, and resistance to change (Fombad & Zenge, 2016). A deeper understanding of these barriers is necessary to develop effective strategies to overcome them.

Looking ahead, it is crucial to address the gaps and challenges identified in this review. Policymakers must ensure adequate funding and the development of comprehensive policies to support ICT integration in education. Additionally, further research is needed to explore the long-term effects of pedagogic ICT integration on students' academic achievement and teachers' professional growth.

This empirical review highlights the significant role of pedagogic ICT integration in improving teachers' effectiveness in selected secondary schools in Cameroon. While challenges exist, the implementation of best practices and policymakers' support can pave the way for successful integration, ultimately benefiting student learning outcomes and societal development.

Despite some research on ICT and education in Cameroon, there are significant gaps that need to be filled. Firstly, there is limited empirical evidence on the impact of ICT integration on teaching and learning outcomes in the Cameroonian context. Most existing studies have focused on the potential benefits of ICT without examining the actual effects on educational outcomes.

Secondly, there is a lack of research that investigates the factors influencing teachers' attitudes and beliefs towards ICT integration. Understanding these factors is crucial for designing appropriate

professional development programs and support systems to encourage teachers to embrace technology in their classrooms.

Lastly, there is a need for research that explores the specific challenges and barriers faced by teachers in integrating ICT into their teaching practices in Cameroon. This includes understanding the issues related to infrastructure, training, and support.

The current study aims to address these gaps by providing empirical evidence on the impact of pedagogic ICT integration on teachers' effectiveness in selected secondary schools in Cameroon. It will also explore the factors influencing successful ICT integration and identify the barriers faced by teachers. By filling these gaps, this research can contribute to the existing literature and inform policy and practice in the field of educational technology in Cameroon.

Theoretical Framework

In this section, we will examine some of the theoretical frameworks and models that can guide the integration of ICT in education. These frameworks and models can help teachers to understand the complex and dynamic relationship between technology, pedagogy, and content, and to design and implement effective and meaningful learning experiences for their students. The four frameworks and models that we will discuss are:

Technological Pedagogical Content Knowledge (TPACK): TPACK is a framework that describes the knowledge that teachers need to integrate technology in their teaching. It consists of three main components: content knowledge, pedagogical knowledge, and technological knowledge, and their interactions (Mishra & Koehler, 2006).

The Constructivist Theory: The constructivist theory is a learning theory that views learning as an active and social process, in which learners construct their own knowledge and understanding through interaction with their environment and others. It emphasizes the role of prior knowledge, authentic tasks, scaffolding, and reflection in learning (Jonassen, 1999).

SAMR Model: SAMR is a model that categorizes the different ways that technology can be used to enhance or transform teaching and learning. It consists of four levels: substitution, augmentation, modification, and redefinition, and it provides a framework for evaluating and improving the use of technology in education (Puentedura, 2013).

The Community of Inquiry Framework: The community of inquiry framework is a model that describes the elements and processes of online learning. It consists of three interrelated presences: cognitive presence, social presence, and teaching presence, and it provides a framework for

designing and facilitating effective and engaging online learning experiences (Garrison et al., 2000).

Technological Pedagogical Content Knowledge (TPACK)

TPACK is a framework that describes the knowledge that teachers need to integrate technology in their teaching. It consists of three main components: content knowledge, pedagogical knowledge, and technological knowledge, and their interactions (Mishra & Koehler, 2006).

Content knowledge is the knowledge of the subject matter that teachers teach, such as concepts, facts, theories, and procedures. Pedagogical knowledge is the knowledge of the methods and strategies that teachers use to teach, such as instructional design, classroom management, assessment, and differentiation. Technological knowledge is the knowledge of the tools and resources that teachers use to support teaching and learning, such as computers, software, internet, and multimedia.

These three components interact with each other to form seven domains of knowledge: content knowledge (CK), pedagogical knowledge (PK), technological knowledge (TK), pedagogical content knowledge (PCK), technological content knowledge (TCK), technological pedagogical knowledge (TPK), and technological pedagogical content knowledge (TPACK). Each domain represents a different aspect of teachers' knowledge and skills for integrating technology in their teaching.

TPACK is the most complex and comprehensive domain, as it requires teachers to understand and balance the interplay of content, pedagogy, and technology in their teaching context. Teachers with high levels of TPACK can select and use appropriate technology to enhance their content and pedagogy, and to address the needs and interests of their students. Teachers with low levels of TPACK may struggle to integrate technology effectively, or may use technology in ways that are irrelevant or detrimental to their content and pedagogy.

The TPACK framework provides a useful lens for understanding and developing teachers' knowledge and skills for ICT integration in education. It also provides a tool for designing and evaluating professional development and curriculum for ICT integration. The TPACK framework can help teachers to reflect on their own strengths and weaknesses, and to identify areas for improvement and learning. The TPACK framework can also help researchers and educators to investigate and measure the impact of ICT integration on teachers' knowledge and practice, and on students' learning outcomes.

The Constructivist Theory

The constructivist theory is a learning theory that views learning as an active and social process, in which learners construct their own knowledge and understanding through interaction with their environment and others. It emphasizes the role of prior knowledge, authentic tasks, scaffolding, and reflection in learning (Jonassen, 19992). According to the constructivist theory, learners are not passive recipients of information, but active agents who construct their own meaning and reality. Learners use their existing knowledge and experience to interpret and make sense of new information and situations. Learners also create and test their own hypotheses and explanations, and revise them based on feedback and evidence.

The constructivist theory also recognizes the social and cultural nature of learning. Learners interact and collaborate with others, such as peers, teachers, and experts, to share and co-construct knowledge and understanding. Learners also participate in authentic and meaningful tasks and contexts, that reflect the real-world problems and practices of their discipline and community. Learners also receive scaffolding and guidance from others, such as modeling, questioning, and feedback, to support their learning and development.

The constructivist theory also highlights the importance of reflection and metacognition in learning. Learners reflect on their own learning process and outcomes, and monitor and regulate their own thinking and behavior. Learners also evaluate and critique their own and others' ideas and arguments, and justify and communicate their own reasoning and evidence.

The constructivist theory has significant implications for ICT integration in education. It suggests that ICT should be used as cognitive tools that enable and enhance learners' active and social construction of knowledge and understanding, rather than as delivery tools that transmit and store information. It also suggests that ICT should be used to provide learners with authentic and meaningful tasks and contexts, that engage them in inquiry and problem-solving, and that connect them with diverse and global audiences and resources. It also suggests that ICT should be used to support learners' reflection and metacognition, that help them to monitor and evaluate their own learning and performance, and to communicate and collaborate with others.

SAMR Model

SAMR is a model that categorizes the different ways that technology can be used to enhance or transform teaching and learning. It consists of four levels: substitution, augmentation, modification,

and redefinition, and it provides a framework for evaluating and improving the use of technology in education (Puentedura, 2013).

Substitution is the lowest level of technology integration, in which technology is used as a direct substitute for an existing tool or task, with no functional change. For example, using a word processor instead of a typewriter, or using an online quiz instead of a paper quiz.

Augmentation is the second level of technology integration, in which technology is used as a direct substitute for an existing tool or task, with some functional improvement. For example, using a word processor with spell check and grammar check, or using an online quiz with immediate feedback and analytics.

Modification is the third level of technology integration, in which technology is used to significantly redesign an existing tool or task, with some functional change. For example, using a word processor with multimedia and hyperlinks, or using an online quiz with adaptive and personalized questions.

Redefinition is the highest level of technology integration, in which technology is used to create new and innovative tools or tasks, that were not possible before. For example, using a word processor to create and publish an interactive e-book, or using an online quiz to create and participate in a global challenge.

The SAMR model provides a useful lens for understanding and developing the use of technology in education. It also provides a tool for designing and evaluating curriculum and instruction for technology integration. The SAMR model can help teachers to reflect on their own use of technology, and to identify opportunities and strategies for enhancing or transforming their teaching and learning. The SAMR model can also help researchers and educators to investigate and measure the impact of technology integration on teaching and learning outcomes.

The Community of Inquiry Framework

The community of inquiry framework is a model that describes the elements and processes of online learning. It consists of three interrelated presences: cognitive presence, social presence, and teaching presence, and it provides a framework for designing and facilitating effective and engaging online learning experiences (Garrison et al., 2004).

Cognitive presence is the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in an online learning environment. It involves four

phases: triggering event, exploration, integration, and resolution. In the triggering event phase, learners encounter a problem or issue that stimulates their curiosity and interest. In the exploration phase, learners search for and exchange information and ideas related to the problem or issue. In the integration phase, learners connect and synthesize the information and ideas into a coherent and meaningful understanding. In the resolution phase, learners apply and test their understanding in real or simulated situations.

Social presence is the degree to which learners feel connected and involved with each other and the instructor in an online learning environment. It involves three dimensions: affective, interactive, and cohesive. In the affective dimension, learners express their emotions, feelings, and values through various media, such as text, audio, video, and emoticons. In the interactive dimension, learners communicate and interact with each other and the instructor through various modes, such as synchronous, asynchronous, formal, and informal. In the cohesive dimension, learners establish and maintain a sense of group identity and community through various strategies, such as greetings, acknowledgments, and references.

Teaching presence is the extent to which the instructor and the learners design, facilitate, and direct the cognitive and social processes in an online learning environment. It involves three components: instructional design and organization, facilitation of discourse, and direct instruction. In the instructional design and organization component, the instructor and the learners plan and prepare the online learning activities, resources, and assessments, and set the goals, expectations, and timelines. In the facilitation of discourse component, the instructor and the learners guide and support the online learning interactions, and encourage and monitor the participation and progress of the learners. In the direct instruction component, the instructor and the learners provide and seek feedback, clarification, and reinforcement, and share and integrate their expertise and experience. The community of inquiry framework provides a useful lens for understanding and developing online learning. It also provides a tool for designing and facilitating online learning experiences that are cognitively and socially engaging and effective. The community of inquiry framework can help teachers to design and implement online learning activities that stimulate and support learners' cognitive and social presence, and to provide and receive teaching presence that guides and enhances learners' online learning. The community of inquiry framework can also help researchers and educators to investigate and measure the impact of online learning on learners' cognitive, social, and teaching presence, and on their learning outcomes.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter outlines the research methodology used to investigate the impact of technology pedagogic integration on teachers' effectiveness in selected secondary schools of Yaounde 7. It describes the research design, sampling techniques, data collection instrument, and data analysis procedures.

Research Design

This study adopted a quantitative research design, employing a survey approach to gather data. This methodology was meticulously chosen for its inherent strengths in addressing the research question within the specific context of Yaounde 7 secondary schools and their English language teachers. The quantitative approach offers several advantages:

Objectivity: Data collected through a survey is numerical and standardized, allowing for objective analysis and comparisons between different groups of teachers. This characteristic is crucial for investigating and reporting on trends across the sample population, fostering clarity and replicability in the research findings.

Generalizability: Surveys inherently possess the ability to reach a broader audience, potentially leading to more generalizable findings applicable to larger populations of English language teachers within Yaounde 7 or similar contexts. This characteristic broadens the potential impact of the research beyond the immediate sample, contributing to the advancement of knowledge within a wider educational sphere.

Standardization: Utilizing a standardized survey instrument ensures consistency and measurability in data collection. This consistency facilitates replication of the study by future researchers, allowing for comparisons and building upon the present findings. Additionally, it enhances the internal validity of the research by minimizing potential biases introduced by variations in data collection methods.

Efficiency: Compared to qualitative methods like interviews, surveys are often more efficient and cost-effective, especially when dealing with larger samples. This characteristic was particularly

relevant in this study due to resource limitations, allowing for a broader reach and data collection within the defined timeframe.

Sampling Techniques

Population and Sample

The target population for this study encompassed all English language teachers currently employed in secondary schools within Yaounde 7. This specific focus allowed for a targeted investigation within a well-defined geographical and educational context, ensuring relevance to the research question. Due to practical limitations, including time and access constraints, a representative sample of 63 teachers was selected. This sample size was determined through power analysis based on anticipated effect sizes and desired statistical power. The power analysis ensured that the sample size would be sufficient to detect statistically significant relationships between the variables of interest with a reasonable degree of confidence.

Sampling Method

To achieve a representative and manageable sample while acknowledging potential limitations, a two-stage sampling approach was employed:

Stage 1: Stratified Sampling

Secondary schools within Yaounde 7 were first stratified based on two key criteria: size (categorized as large, medium, or small) and location (categorized as urban, suburban, or rural). This stratification ensured that the sample adequately represented the diverse school environments within the target population, preventing potential bias towards specific types of schools.

Within each stratum, proportional sampling was employed. This method selected a number of schools proportional to their size within the overall population, ensuring that larger schools with more teachers had a higher chance of being included in the sample. This approach further enhanced the representativeness of the final sample.

Stage 2: Convenience Sampling

With the assistance and cooperation of department heads in selected schools, the online questionnaire was distributed through forums or shared links accessible to English language teachers within those schools. This method acknowledged the potential limitation of introducing self-selection bias, as teachers who chose to participate may have certain characteristics or opinions that differ from the broader population. However, it facilitated efficient data collection

within the chosen schools and maximized the number of participants within the determined timeframe.

This combined sampling approach balanced the need for representativeness achieved through stratification with the practical considerations of convenience sampling. While acknowledging potential limitations, it aimed to provide a manageable and informative sample of English language teachers in Yaounde 7, offering valuable insights into the relationship between technology pedagogic integration and their effectiveness.

Data Collection Instrument

Questionnaire

A self-administered questionnaire designed specifically for this research and hosted on Google Forms served as the primary instrument for collecting quantitative data. This method was chosen for its efficient data collection, anonymity, and ability to reach a widespread audience within the selected schools. The questionnaire consisted of 23 open and closed-ended questions, divided into four distinct sections aligned with the research objectives:

Table 1: Questionnaire Characteristics

FEATURE	DESCRIPTION
Format	Self-administered, online questionnaire
Platform	Google Forms
Number of sections	4 (sections A-D)
Number of questions	23
Question types	Primarily closed-ended, Likert-scale items
Target audience	English language teachers in Yaounde 7 secondary schools

The questionnaire was designed with four sections:

Section I: Demographic information (school name, region, class taught, age range, highest qualification, years of experience)

Section II: Teachers' perceptions of pedagogy and its impact on effectiveness (Likert-scale items)

Section III: Teachers' perceptions of technology accessibility and its impact on effectiveness (Likert-scale items)

Section IV: Teachers' perspectives on collaboration, communication, and professional development related to technology integration (Likert-scale items)

Data Analysis Procedures

Quantitative Data

To analyze the collected quantitative data from the questionnaire, a multi-pronged approach will be employed:

Descriptive statistics: This initial step will involve summarizing key demographic characteristics of the participants, such as age, experience, and school type. Additionally, descriptive statistics will be used to analyze the distribution of responses for each question in the survey, providing insights into the central tendencies and variations within the data.

Inferential statistics: This approach will delve deeper to investigate potential relationships between variables of interest on whether teachers' perceived effectiveness differs based on their level of technology access or participation in professional development programs related to technology integration. The specific statistical tests employed will be determined based on the nature of the research questions, the type of data collected, and assumptions regarding normality and homogeneity of variances.

Ethical Considerations

This research adheres to the highest ethical standards to ensure the privacy, safety, and well-being of the participants. Informed consent, participant anonymity, data confidentiality, and ethical approval were prioritized throughout the study.

Informed Consent

Prior to participation, all teachers the researcher met in school were provided with detailed information outlining the study objectives, data collection methods, potential risks and benefits, and their right to withdraw at any stage. Therefore, the participants voluntarily participated.

Anonymity and Confidentiality

The questionnaire was designed to ensure participant anonymity. No personally identifiable information, such as names, school identification details, or contact information, was collected. Data was coded using unique identifiers, and all reports and publications will present findings in an aggregate manner to prevent individual identification. Additionally, data storage will comply with relevant data protection regulations to uphold confidentiality.

Chapter Summary

This chapter has outlined the methodology employed in this research, including the research design, sampling techniques, data collection instrument, and data analysis procedures. Through a survey, this approach aims to provide quantitative insights into the relationship between technology pedagogic integration and teacher effectiveness in the selected schools.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF THE RESULTS OF FINDINGS

This chapter focuses on data analysis, presentation and interpretation of the results of the findings of the study. Here, both the descriptive and the inferential statistics are used to analyse the data. The chapter is divided into three different parts. The first part dwells on the analysis of the data. The second part focuses on the presentation of the data in tabular forms while the third part of the chapter focuses on the interpretation of the results.

Presentation of the results of the descriptive statistics

The present section focuses on presenting the results of the descriptive statistics of the study. It starts with the socio-demographic variables, followed by the descriptive statistics on each sub-variable of the study.

Descriptive statistics on participant's information

Demographic characteristics in this study includes; age, sex, level of education, position occupy and years of experience. The tables below presents the results on the demographic information of the participants of the study.

Gender of respondent

The table below represents the gender distribution of respondents. In the context of this study, we use a sample population of 40 respondents. According to the table, 19 of the respondents are male while 26 of the respondents are female, making a percentage of 42.0 and 58.0 respectively. This variation is due to the fact that there are more females than males in the sample population which was taken from those who took part in responding to the questionnaires.

Table 2: Gender of respondent

		Frequency	Percent
Valid	Male	19	42.0
	Female	21	58.0
	Total	40	100.0

Source: fieldwork, 2024.

Age range of respondents

The age distribution for this study included the age range of the teachers who participated in this study from the selected secondary schools of Yaounde 7. The result shows that 2.5% are between the age ranges of 16-20years, 2.5% are between 21-25years, 15% have ages between 26 to 30 years and 50% are between 31-40years while 30% are above 41 years of age.

Table 3: age range of respondents

		Frequency	Percent
Valid	16-20	1	2.5
	21-25	1	2.5
	26-30	6	15.0
	31-40	20	50.0
	greater than 41	12	30.0
	Total	40	100.0

Source: fieldwork; 2024.

Highest qualification of respondent

The highest qualification of teachers who participated in this study from the selected schools of Yaounde 7 was taken into consideration from a sample population of 40 participants. The levels of education of the participants for this study were taken to range from BSC, Masters, Dipes1, Dipes2 and PhD. With respect to the level of education, more than half of the respondents 24 (60.0%) have a DIPES 2, 1(2.5%) are holders of MSC, 10 (25.0) are holders of DIPES 1, 3(7.5%) are holders DIPES, PhD while 1(2.5%) had Bachelor's degree.

Table 4: highest qualification of respondent

		Frequency	Percent
Valid	BSC	2	5.0
	Masters	1	2.5
	DIPES 1	10	25.0
	DIPES2	24	60.0
	PhD	3	7.5
	Total	40	100.0

Source: fieldwork, 2024.

Years of teaching of respondent

The years of teaching for this study included the number of years the teachers have spent in the service so far. The results shows that 4(10.0%) of the teachers have been in service for 1-5 years, 10(25.0%) for 6-10 years, 14(35.0%) have been in service for 11-15 years, 9(22.5%) for 16-20 years while 3(7.5%) have been teaching for above 21 years in service.

Table 5: Years of teaching of respondent

		Frequency	Percent
Valid	1-5	4	10.0
	6-10	10	25.0
	11-15	14	35.0
	16-20	9	22.5
	greater than 21	3	7.5
	Total	40	100.0

Source: fieldwork, 2024.

Presentation of the descriptive statistics on the variables of the study

The present section focuses on presenting the results of the descriptive statistics based on the variables of the study. Here, the focus is on pedagogy, technology accessibility, collaboration and communication, professional development and teacher's effectiveness. The following tables below presents the results of the descriptive statistics on the main variables of the study.

The first research objective aims to determine that pedagogy has an impact on teacher's effectiveness. The participants responses were scaled according to level of agreement or disagreement presented in a Likert scale of 5-1 (strongly agree, agree neutral, disagree and strongly disagree)

As shown on the table above, the respondent's views were graded using the five likert scale. Six items were designed in the questionnaire to respond to the objective of pedagogy as follows; using technology in my teaching enhances the effectiveness of my lessons 15(35.5%) respondents agree, secondly , I feel confident in integrating technology into teaching practice with a frequency of 17 and 42.5% of respondents corresponding to agree, thirdly technology helps me cater for different learning styles in my classroom 17(42.5%) agree, fourth, implementing innovative pedagogical strategies improves my effectiveness as a teacher 21(52.5) agrees, fifth, I believe that incorporating technology in my institution improves student engagement ant participation 20(58.0%) strongly agree, sixth; technology helps me cater for different learning abilities in my classroom 19(47.5%) strongly agrees.

Table 6: Impact of pedagogy on teacher's effectiveness

No	Item	SA		A		N		D		SD		Mean	Standard deviation
		F	%	f	%	f	%	f	%	f	%		
1	Using technology in my teaching enhances the effectiveness of my teachings	14	35.0	15	37.5	8	20.0	3	7.5	0	0	4.0000	.93370
2	I feel confident in integrating technology in teaching practices	14	35.0	17	42.5	6	15.0	3	7.5	0	0	4.0500	.90441
3	Technology helps me cater to different learning / styles in my classroom	15	37.5	17	42.5	6	15.0	2	5.0	0	0	4.1250	.85297
4	Implementing innovative pedagogical strategies improves my effectiveness as a teacher.	15	37.5	21	52.5	3	7.5	1	2.5	0	0	4.2500	.70711
5	I believe that incorporating technology in my institution improves students engagement and participation	20	58.6	16	40.0	3	7.5	0	0	1	2.5	4.3500	.83359
6	Technology helps me cater to different learning abilities in my classroom	19	47.5	17	42.5	3	7.5	0	0	1	2.5	4.3250	.82858
TOTAL												4.1833	0.84339

Source: Researcher from field work, 2024

From the findings of the research objective one, the majority of the respondents agreed that pedagogy has a strong effect on the teacher's effectiveness with a cut off mean 4.1833 and standard deviation 0.84339 which is above a normal cut off mean of 2.5. Among the 6 items which were designed to measure the influence pedagogy has on teacher's effectiveness, all the items were more than 2.5 which is the cut off mean.

The research objective two aims to determine that technology accessibility has an impact on teacher's effectiveness. The participants responses were scaled according to level of agreement or disagreement presented in a Likert scale of 5-1 (strongly agree, agree neutral, disagree and strongly disagree).

The table below shows the modalities that were analysed for this objective: firstly; the availability of technological resources that support my teaching goals 23(57.5%) strongly agree, secondly; I have access to technological resources that support my teaching goals 22(55.5%) strongly agree, thirdly; the technological infrastructure in my school is reliable and well-maintained 22(55.0%) agree, fourth; I can easily access and use software and applications that enhance my teaching 20(50.0%) agree, fifth, the school administration provides adequate support and training for utilizing technology in my classroom 23(57.5%) strongly agree, and lastly, I have access to technological tools that support my teaching goals 18(45.0%) strongly agrees.

Table 7: Impact of technology accessibility on teacher's effectiveness

No	Item	SA		A		N		D		SD		Mean	Standard deviation
		F	%	f	%	F	%	f	%	f	%		
7	The availability of technology resources in my school is sufficient for effective teaching	23	57.5	12	30.0	4	10.0	1	2.5	0	0	4.4250	.78078
8	I have access to technological resources that support my teaching goals	22	55.5	12	30.0	3	7.5	3	7.5	0	0	4.3250	.91672
9	The technology infrastructure in my school is reliable and wee-maintained	15	37.5	22	55.0	2	5.0	0	0	1	2.5	4.2500	.77625
10	I can easily access and use software and applications that enhance teaching	17	42.5	20	50.0	2	5.0	0	0	1	2.5	4.3000	.79097
11	The school administration provides adequate support and training for utilizing technology in the classroom	23	57.5	13	32.5	2	5.0	1	2.5	1	2.5	4.4000	.90014
12	I have access to technological tools that support my teaching goals	18	45.0	15	37.5	6	15.0	1	2.5	0	0	4.2500	.80861
TOTAL												4.3542	.82891

Source: Researcher from field work, 2024

The cut off mean here is 2.5 for this objective. Therefore, it can be concluded with a mean of 4.3542 which means that a majority of the respondents strongly agree that pedagogy is important in enhancing teacher's effectiveness. This means that there is a strong relationship between the technology accessibility and teacher's effectiveness.

Third research objective aims to determine that collaboration and communication has an impact on teacher's effectiveness. The participants responses were scaled according to level of agreement or disagreement presented in a Likert scale of 5-1 (strongly agree, agree neutral, disagree and strongly disagree). This is represented on the table below with 6 items designed for this objective.

Table 8: Impact of collaboration and communication on teacher's effectiveness

No	Item	SA		A		N		D		SD		Mean	Standard deviation
		F	%	f	%	f	%	f	%	f	%		
13	Collaborating with colleagues on technology integration projects enhances my teaching effectiveness	13	32.5	19	47.5	6	15.0	2	5.0	0	0	4.0750	4.82858
14	I actively seek opportunities to share and learn from other teacher's experiences with technology	14	35.5	14	35.5	8	20.0	3	7.5	1	2.5	3.9250	1.04728
15	Technology enables effective communication with students and their parents	13	32.5	16	40.0	6	15.0	4	10.0	1	2.5	3.9000	1.05733
16	I feel supported by my colleagues in my efforts to integrate technology in my teaching	13	32.5	14	35.5	7	17.5	3	7.5	3	7.5	3.7750	1.20868
17	Collaborative platforms and tools facilitate efficient and meaningful communication among teacher, students and their parents	10	25.5	17	42.5	5	12.5	5	12.5	3	7.5	3.6500	1.21000
18	Technology enables effective communication with parents	13	32.5	12	30.0	7	17.5	7	17.5	1	2.5	3.7250	1.17642
TOTAL												3.8417	1.08805

Source: Researcher from field work, 2024

As seen on the table above, six items were designed to explain the third objective on collaboration and communication as follows; 19(47.5%) respondents agree that collaborating with colleagues on technology integration projects enhances teacher's effectiveness. secondly; 14(35.5%) of respondents strongly agree that they actively seek opportunities to share and learn from other teacher's experiences with technology, thirdly; 16(40.0%) agree that technology enables effective communication with students and parents; fourthly, 14(35.0%) respondents agree they feel supported by colleagues in their efforts to integrate technology in teaching. fifth, 17(42.5%) respondents agree that collaborative platforms and tools facilitate efficient and meaningful communication among teachers and students, sixth, 13(32.5%) of respondents also strongly agrees that technology enables effective communication with parents.

The cut off mean for this objective is 2.5. Therefore, it can be concluded with a mean of 3.8417 that a majority of the respondents agree that collaboration and communication has an impact on the effectiveness of teachers. This implies that there is a strong relationship between collaboration and communication and the effectiveness of teachers.

The research objective four aims to determine that professional development has an impact on teacher's effectiveness. The participants responses were scaled according to level of agreement or disagreement presented in a Likert scale of 5-1 (strongly agree, agree neutral, disagree and strongly disagree).

Table 9: Impact of professional development on teacher's effectiveness

No	Item	SA		A		N		D		SD		Mean	Standard deviation
		F	%	F	%	f	%	f	%	f	%		
19	I participate in professional development programs that enhance my knowledge and skills in technology integration	15	37.5	10	25.0	8	20.0	7	17.5	0	0	3.8250	1.12973
20	I participate in professional development programs that enhance my knowledge and skills in technology integration	14	35.0	14	35.0	8	20.0	4	10.0	0	0	3.9500	.98580
21	The schools provides regular opportunities for professional growth in the area of technology integration	15	37.5	11	27.5	10	25.0	4	10.0	0	0	3.9250	1.02250
22	I feel adequately prepared to use technology effectively in my classroom	11	27.5	15	37.5	11	27.5	3	7.5	0	0	3.8500	.92126
23	Attending workshops and conferences on technology integration has a positive impact on my teaching effectiveness	8	20.0	20	50.0	8	20.0	3	7.5	1	2.5	3.7750	.94699
TOTAL												3.8650	1.00126

Source: Researcher from field work, 202

The research objective number 4 was analyzed using five objectives. It was found out that; firstly, 15(37.5) of the respondents strongly agrees that they participate in professional development programs that enhances their knowledge and skills in technology integration. Secondly, 14(35.0) participants strongly agrees that they participates in professional programs. Thirdly, 15(37.5) equally strongly agrees that the school provides regular opportunities for professional growth in the area of technology integration. Fourthly, is was observed that 15(37.5) participants also agrees that they are adequately prepared to use technology effectively in their classrooms. Lastly, 20(50.0) participants also agrees that attending workshops and conferences has a positive impact on enhancing teacher's effectiveness.

The cut off mean for this objective is 2.5. Therefore, it can be concluded with a mean of 3.8650 that a majority of the respondents agree that professional development has an impact on the effectiveness of teachers. This implies that there is a strong relationship between collaboration and communication and the effectiveness of teachers.

The research findings of the dependent variable teacher's effectiveness was analyzed using; frequencies, percentages, weighted mean, and standard deviation too as shown in the table below. The responses were also scaled using Likert scale (Strongly Agree, Agree, Disagree and Strongly Disagree).

Table 10: Teacher’s effectiveness

No	Item	SA		A		N		D		SD		Mean	Standard deviation
		F	%	F	%	f	%	f	%	F	%		
24	Teachers are engaged in execution of their profession	11	27.5	15	37.5	7	17.5	5	12.5	2	5.0	3.7000	.15913
25	Teachers regularly prepares lessons before going to class	13	32.5	13	32.5	8	20.0	5	12.5	1	2.5	3.8000	1.11401
26	Success rate of students is satisfactory	11	27.5	17	42.5	4	10.0	5	12.5	3	7.5	3.7000	1.22370
27	Teachers effectively manage classrooms	7	17.5	18	45.0	8	20.0	3	7.5	4	10.0	3.5250	1.17642
TOTAL												3.6813	.91832

Source: Researcher from field work, 2024

The dependent variable was analysed using 4 modalities; from the table above it can be seen that 15(37.5%) respondents agree that teachers are engaged in the execution of their profession, secondly 13(32.5%) respondents strongly agree that teachers regularly prepares lessons before going to class. Thirdly, 17(42.5%) agree that success rate of students is satisfactory. And lastly, 18(45.0%) agrees that teachers effectively manage classrooms.

Therefore, following the cut off mean of 2.5 and the calculated mean of the dependent variable which is 3.6813, shows that a majority of the respondents agree that teacher's effectiveness was greatly influenced by; pedagogy, technology accessibility, collaboration and communication and professional development.

Results of inferential statistics of the study

The present section focuses on the verification of the research hypotheses of the study. To measure the research hypotheses of the study, the simple linear regression was used. The independent variable was regressed on the dependent variable. To test the effects of technology integration on teacher's effectiveness, it is important to state the null and the alternative hypothesis of the study.

H₀: Technology pedagogic integration has a statistically significant effect on teachers effectiveness in some selected secondary schools in Yaounde VII subdivision.

H₀: Technology pedagogic integration has no statistically significant effect on teachers effectiveness in some selected secondary schools in Yaounde VII subdivision.

The following tables below presents the results of the inferential statistics used to verify the various research hypotheses.

Verification of research hypothesis one

To measure the effects of pedagogy on teacher's effectiveness in some selected secondary in Yaounde VII subdivision, it is important to state the null and the alternative hypothesis.

H₀₁: Pedagogy has no statistically significant effect on teacher's effectiveness in some selected secondary schools in Yaounde VII subdivision.

Ha1: Pedagogy has a statistically significant effect on teacher's effectiveness in some selected secondary schools in Yaounde VII subdivision.

All the tables below presents the results of the simple linear regression on pedagogy and the effectiveness of teachers in secondary schools.

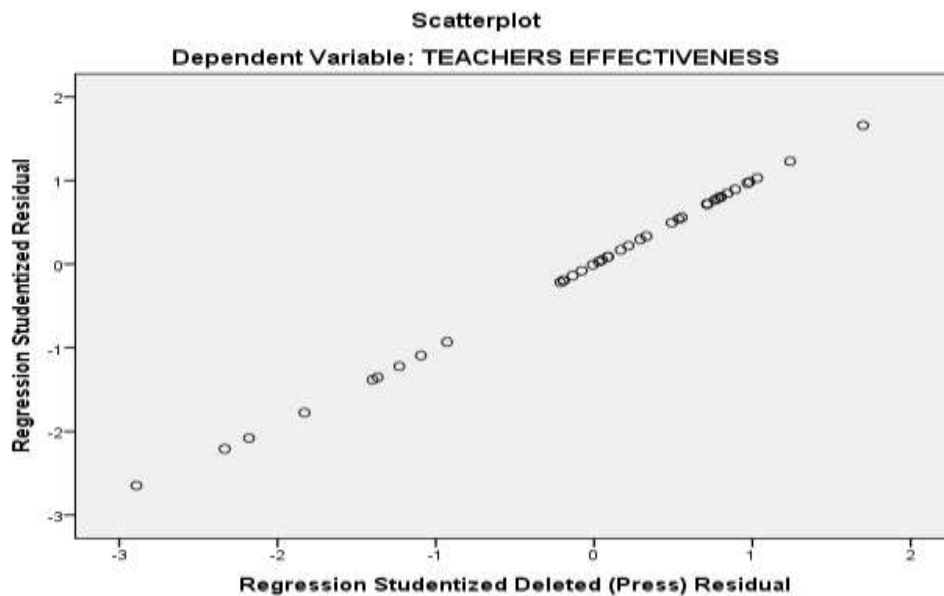
Table 11: Model summary of the impact of pedagogy on teacher's effectiveness

Model	R	R Square	Adjusted Square	R Std. Error of the Estimate
1	.081 ^a	.007	.182	.23369

a. Predictors: (Constant), PEDAGOGY

b. Dependent Variable: TEACHERS EFFECTIVENESS

Figure 1: Scattered plot of pedagogy and teacher's effectiveness



The scattered plot shows that there is a positive linear relationship between pedagogy and teacher's effectiveness, which is in line with a Pearson's correlation coefficient of $r=0.081$. The regression model predicted 18.2% of the variance in teacher's effectiveness. Therefore, the model is a good fit for the data

Table 12: ANOVA of the impact of pedagogy on teacher's effectiveness

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.270	1	.270	24.253	.000 ^b
	Residual	40.603	38	1.069		
	Total	40.873	39			

a. Dependent Variable: TEACHERS EFFECTIVENESS

b. Predictors: (Constant), PEDAGOGY

The table above represents the F test. According to the linear regression F test states that the null hypothesis pedagogy is not statistically impact teachers effectiveness at $p=0.05$. Likewise, $R^2=0$, with $F(1, 38) = 24.253$, $p<.000$, showing a significant test. Thus, we can conclude that pedagogy is statistically significant with teacher's effectiveness.

Table 13: Coefficient of the impact of pedagogy on teacher's effectiveness

	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.180	1.010		18.149	.000
	PEDAGOGY	.120	.238	.081	5.503	.000

a. Dependent Variable: TEACHERS EFFECTIVENESS

The results on the table above shows that pedagogy and teacher's effectiveness is statistically significant ($t = 18.149$, $p= 0.000$). Thus, a slope coefficient for teacher's effectiveness is .081, hence, pedagogy at a constant zero, teacher's effectiveness increases with a gradient of 3.180. At 5% level of significance and 95% competence level, had 0.000 level of significance, which means that pedagogy has a statistically significant effect on teacher's effectiveness in some Selected secondary schools in Yaounde VII.

Verification of research hypothesis two

To measure the effects of technology accessibility on teacher's effectiveness in some selected secondary in Yaounde VII subdivision, it is important to state the null and the alternative hypothesis.

Ho2: Technology accessibility has no statistically significant effect on teacher's effectiveness in some selected secondary schools in Yaounde VII subdivision.

Ha2: Technology accessibility has a statistically significant effect on teacher's effectiveness in some selected secondary schools in Yaounde VII subdivision.

All the tables below presents the results of the simple linear regression on pedagogy and the effectiveness of teachers in secondary schools.

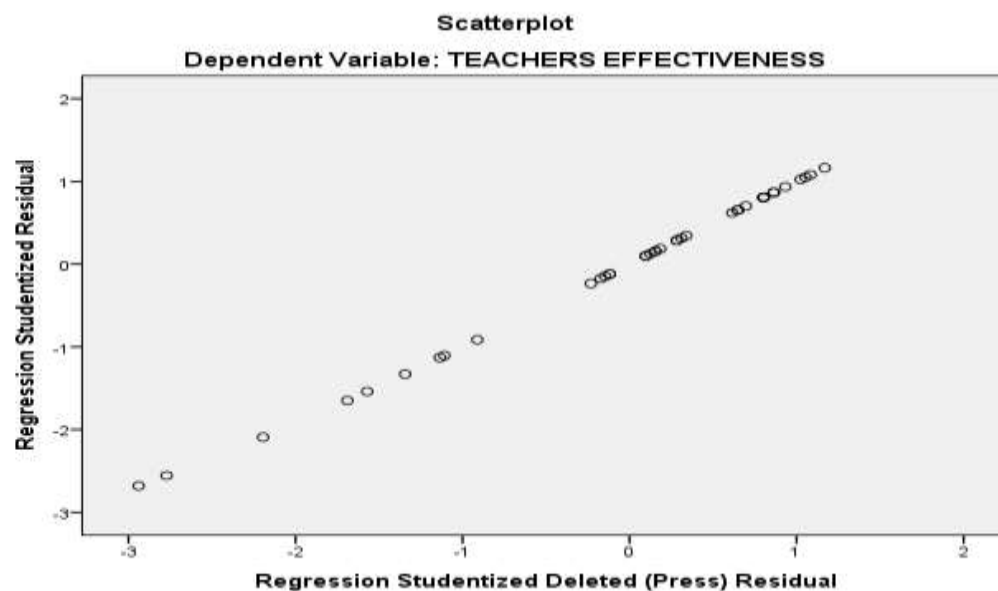
Table 14: Model summary of the role of technology on teacher's effectiveness

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.208 ^a	.052	.044	.53104

a. Predictors: (Constant), TECHNOLOGY ACCESSIBILITY

b. Dependent Variable: TEACHERS EFFECTIVENESS

Figure 2: Scattered plot of the role of technology on teacher's effectiveness



The scattered plot shows a positive linear relationship between technology accessibility and teacher's effectiveness with Pearson's correlation coefficient of $r=.208$. The regression predicts 5.2% of teacher's effectiveness variance. Thus, the goodness of fit of the data

Table 15: ANOVA of the role of technology on teacher's effectiveness

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.478	1	.478	14.450	.000 ^b
	Residual	40.396	38	1.063		
	Total	40.873	39			

a. Dependent Variable: TEACHERS EFFECTIVENESS

c. Predictors: (Constant), TECHNOLOGY ACCESSIBILITY

The table above represents the results of the F test. Technology accessibility has a statistically significant effect on teacher's effectiveness with $F(1, 38) = 14.450$, $P < .000$, the test is highly significant. Therefore, implying a statistically significant effect of technology accessibility on teacher's effectiveness.

Table 16: Coefficient of the role of technology on teacher's effectiveness

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.438	1.140		13.892	.000
	TECHNOLOGY ACCESSIBILITY	.175	.261	.208	3.671	.000

a. Dependent Variable: TEACHERS EFFECTIVENESS

The table above shows the coefficient of the technology accessibility on teacher's effectiveness with a statistically significant results ($t = 13.892$, $p = 0.000$). The slope coefficient is .208. The

results equally reveals that technology accessibility at a constant zero, teacher's effectiveness will be 4.438. This means that any unit increase in technology accessibility will lead to 0.175 increase in teacher's effectiveness. At 5% level of significance and 95% level of confidence interval of 0.000 level of significance. Meaning that technology accessibility has a significant effect on teacher's effectiveness.

Verification of research hypothesis three

To measure the effects of collaboration and communication on teacher's effectiveness in some selected secondary in Yaounde VII subdivision, it is important to state the null and the alternative hypothesis.

Ho3: Collaboration and communication has no statistically significant effect on teacher's effectiveness in some selected secondary schools in Yaounde VII subdivision.

Ha3: Collaboration and communication has a statistically significant effect on teacher's effectiveness in some selected secondary schools in Yaounde VII subdivision.

All the tables below presents the results of the simple linear regression on pedagogy and the effectiveness of teachers in secondary schools.

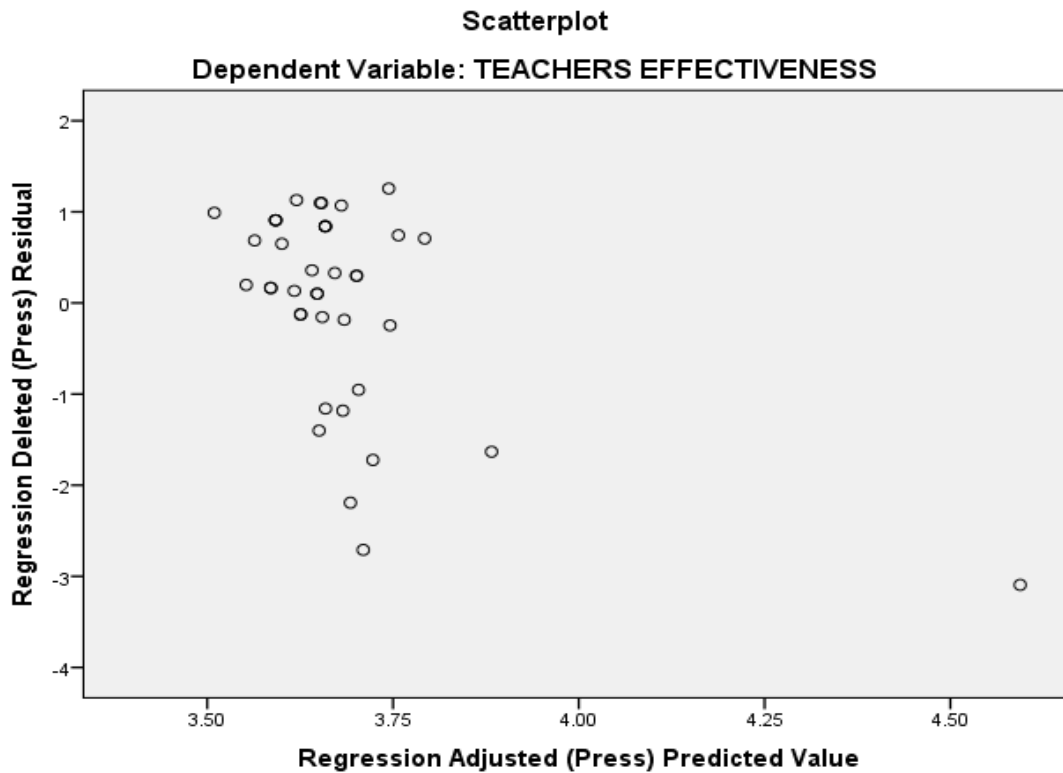
Table 17: Model summary of the influence of collaboration and communication on teacher's effectiveness

Model Summary^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.293 ^a	.037	.012	1.01763

a. Predictors: (Constant), Collaboration And Communication

b. Dependent Variable: Teachers Effectiveness

Figure 3: Scattered plot of the influence of collaboration and communication on teacher's effectiveness



The scattered plot shows that there is a strong positive linear relationship between collaboration and communication and teacher's effectiveness which is confirmed by a Pearson's correlation coefficient of $r=0.293$. The regression model predicted 3.7% of the variance in teacher's effectiveness. Thus, the model is at good fit at $F(1, 39) = 8.469, P<.000$.

Table 18: ANOVA of the influence of collaboration and communication on teacher's effectiveness

ANOVA^a

	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.521	1	1.521	8.469	.000 ^b
	Residual	39.352	38	1.036		
	Total	40.873	39			

a. Dependent Variable: teachers effectiveness

b. Predictors: (Constant), collaboration and communication

The table above represents the ANOVA results which shows that the linear regression F test has the null hypothesis that collaboration and communication does not influence teacher's effectiveness. Given that $r=R^2=0$ with $F(1, 38) = 8.469$, $P<.000$, the test is highly significant. Implying that collaboration and communication has a statistically significant influence on teacher's effectiveness.

Table 19: Coefficient of the influence of collaboration and communication on teacher's effectiveness

		Coefficients ^a			
	Model	Unstandardized		Standardized	Sig.
		Coefficients		Coefficients	
		B	Std. Error	Beta	
	(Constant)	4.490	.686		6.542 .000
1	Collaboration and Communication	.211	.174	.293	1.212 .000

a. Dependent Variable: Teachers Effectiveness

The regression equation shows a statistically significant relationship between collaboration and teacher's effectiveness ($t = 6.542$, $p<.000$). The gradient coefficient for collaboration is .293. This means that the test is highly significant. The result also reveal that collaboration and communication at a constant of zero, teachers effectiveness will be at 4.490, meaning that any unit increase in collaboration and communication will lead to 0.211 increase in teachers effectiveness. At 5% level of significance and 95% competence and 0.000 level of significance, meaning that collaboration and communication has a statistically significant effect on teachers effectiveness.

Verification of research hypothesis four

To measure the effects of professional development on teacher's effectiveness in some selected secondary in Yaounde VII subdivision, it is important to state the null and the alternative hypothesis.

H₀₄: professional development has no statistically significant effect on teacher's effectiveness in some selected secondary schools in Yaounde VII subdivision.

Ha4: professional development has a statistically significant effect on teacher's effectiveness in some selected secondary schools in Yaounde VII subdivision.

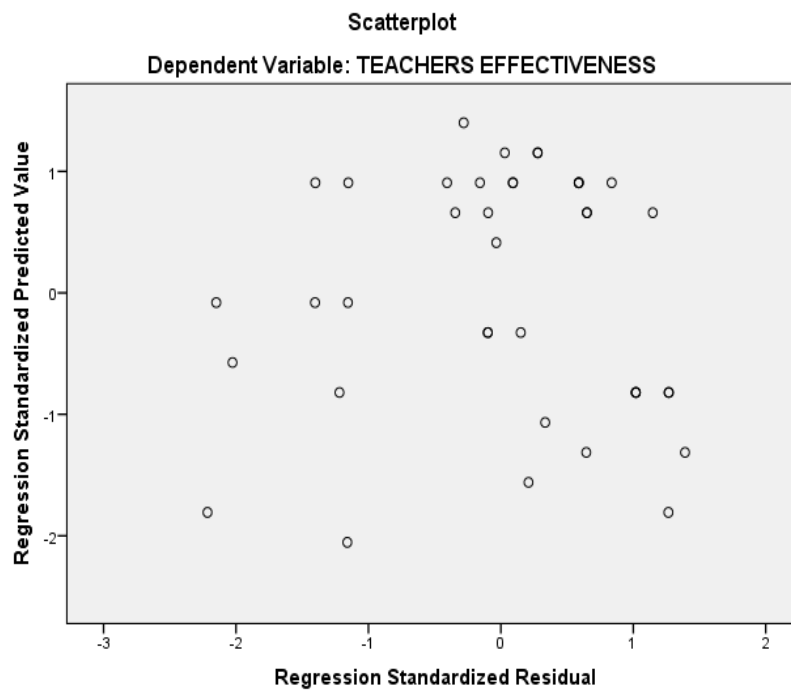
All the tables below presents the results of the simple linear regression on pedagogy and the effectiveness of teachers in secondary schools.

Table 20: Model summary of the effects of professional development on teacher's effectiveness

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.245 ^a	.060	.035	1.00552

a. Predictors: (Constant), Professional Development

b. Dependent Variable: Teachers Effectiveness



The scattered plot shows that there is a positive relationship between professional development and teacher's effectiveness with Pearson correlation coefficient of $r=0.245$. The regression model predicted 6.0% of the teacher's effectiveness variance. Therefore, the goodness of fit for the data is $F(1, 38) = 15.426, p = 0.000$.

Table 22: ANOVA of the effects of professional development on teacher's effectiveness

ANOVA ^a					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	2.453	1	2.453	15.426	.000 ^b
Residual	38.421	38	1.011		
Total	40.873	39			

a. Dependent Variable: Teachers Effectiveness

b. Predictors: (Constant), Professional Development

The table above shows the results of F value. Professional development has a statistically significant effect on teacher's effectiveness with $F(1, 38) = 15.426$, $P < .000$, the test is highly significant. Therefore, we can conclude that there is a statistically significant effect of professional development and teacher's effectiveness.

Table 23: Coefficient of the impact of professional development on teacher's effectiveness

Coefficients ^a					
Model	Unstandardized Coefficients	Standardized Coefficients	T	Sig.	
	B	Std. Error	Beta		
(Constant)	2.486	.784		11.171	.000
1 PROFESSIONAL DEVELOPMENT	.309	.199	.245	3.558	.000

a. Dependent Variable: TEACHERS EFFECTIVENESS

The regression results shows a significant relationship between professional development and teacher's effectiveness ($t = 11.171$, $p = 0.000$. the slope coefficient is 0.245. The results also reveals that professional development at a constant zero, teacher's effectiveness is 2.486. This implies that any unit increase in professional development will lead to 0.309 increase in teacher's effectiveness. At 5% level of significance and 95% level of confidence, professional development had a 0.000 level of significance, meaning that professional development has a significant effect on teacher's effectiveness.

Interpretation of results of findings

The present section focuses on the interpretation of the results of findings of the study. This involves providing a deeper understanding of the results obtained after analysis. The results are interpreted basing on the research objectives of the study.

Research objective one

The research objective one seeks to examine the effects of pedagogy on the effectiveness of teachers. The model summary indicates that there is a positive linear relationship between pedagogy and teacher's effectiveness, which is in line with Pearson's correlation coefficient of $r=0.081$. The regression model predicted 18.2% of the variance in teacher's effectiveness. Therefore, the model is a good fit for the data. The F test carried out to determine the effects of pedagogy on the effectiveness of teachers. According to the linear regression F test states that the null hypothesis pedagogy does not statistically impact teachers effectiveness at $p=0.05$. Likewise, $R^2= 0$, with $F(1, 38) = 24.253$, $p<.000$, showing a significant test. Thus we can conclude that pedagogy is statistically significant with teacher's effectiveness. The results further shows that pedagogy and teacher's effectiveness is statistically significant ($t = 18.149$, $p= 0.000$). Thus a slope coefficient for teacher's effectiveness is .081, hence, pedagogy at a constant zero, teacher's effectiveness increases with a gradient of 3.180. At 5% level of significance and 95% competence level, had 0.000 level of significance, which means that pedagogy has a statistically significant effect on teacher's effectiveness in some selected secondary schools in Yaounde VII.

The above results indicates that pedagogy influences the effectiveness of teachers in secondary schools in Yaounde. Pedagogy is the practice of teaching. Pedagogy is the art and science of teaching. It involves the theory and practice of how knowledge and skills are transmitted from one person to another. The theoretical part of pedagogy is the strict application of educational theories. This involves understanding how learners acquire knowledge, the different learning styles and how to create effective learning environments. This involves choosing and implementing appropriate teaching strategies, designing curriculum, assessing students learning and adapting instruction to meet individual's needs. On the practical dimension, pedagogy entails the application of theoretical knowledge in real-world teaching situations. This involves choosing and implementing appropriate

teaching strategies, designing curriculum, assessing students learning outcomes and adapting instruction to meet specific needs of students.

Pedagogy is generally seen as a determinant of teachers effectiveness as it provide the framework for them to use variety of teaching approaches to enhance students understanding. The effectiveness of a teacher therefore depends on his/her ability to use different teaching approaches interchangeably. This is because pedagogic approach used by a teacher depends on the context and the types of audience. It recognizes that teaching and learning occur within specific contexts, including in school, the community and the broader society. This implies that effective pedagogy must be sensitive to the cultural, social and economic factors that influence learning.

The effectiveness of a teacher therefore depends on his ability to make use of diverse teaching methods in a classroom. This is because the contexts are different and so too are learners. Teachers are thus required to integrate different pedagogical approaches in a classroom setting since its provides different possibility for students to learn. This involves the integration of the hybrid teaching method in classrooms. The hybrid teaching approach is the used of both the traditional and the modern methods of teaching in a class. This initiative will improve on students understanding and assimilation of classroom lectures. This helps to make the teacher very effective as students find it easier to assimilate lectures.

Effective pedagogy consists of curriculum design which involves developing and organizing learning materials and experiences to achieve specific learning goals. Pedagogy also entails selecting and implementing teaching strategies that are effective for specific learning objectives and students. Pedagogy also involves classroom management which is all about creating a positive and productive learning environment which fosters student engagement and motivation. It involves building a positive relationship with students and fostering effective communication.

Effective pedagogy is proportionate to effectiveness of teachers as it emphasis on teaching methods. It is thus crucial for creating high-quality learning experiences which engage students, promote deep understanding and lead to meaningful learning outcomes. It also ensures students success through the application of pedagogical principles, through which teachers can help students to develop their potentials, achieve their learning goals and prepare for success in their future endeavors.

Research objective two

The model summary shows a positive linear relationship between technology accessibility and teacher's effectiveness with Pearson's correlation coefficient of $r=.208$. The regression predicts 5.2% of teacher's effectiveness variance. Thus, the goodness of fit of the data. The F test. Was used to determine the effect of technology accessibility and teachers effectiveness. Technology accessibility has a statistically significant effect on teacher's effectiveness with $F(1, 38) = 14.450$, $P<.000$, the test is highly significant. Therefore, implying a statistically significant effect of technology accessibility on teacher's effectiveness. The results also shows that the coefficient of the technology accessibility on teacher's effectiveness with a statistically significant results ($t = 13.892$, $p = 0.000$). The slope coefficient is .208. The results equally reveals that technology accessibility at a constant zero, teacher's effectiveness will be 4.438. This means that any unit increase in technology accessibility will lead to 0.175 increase in teacher's effectiveness. At 5% level of significance and 95% level of confidence interval of 0.000 level of significance. Meaning that technology accessibility has a significant effect on teacher's effectiveness.

In education, technology integration has become the concern of governments, educationists, policymakers, and educational community who sees the need of expanding access to quality education. The UNOs in its 2030 agenda of sustainable development advocates for lifelong learning opportunities for all irrespective of cultural background, geographical location, gender, age, race, and ethnic belongings. In order to meet up with this goal, technology has been seen as the appropriate mechanism through which quality education can be ensured for all.

In Cameroon, since 2015, the government has multiplied efforts to ensure quality education for all the citizens no matter their location. One of this mechanism involves effective integration of technology into the education system. Although the efforts of the government are demands a lot of applaud, these efforts are pledged by a number of difficulties and obstacles. One of these obstacles include ensuring access to internet connectivity to all the secondary schools in the four corners of the country. The findings thus reveal that effective integration of technology in schools by teachers will improve students' performance and hence ensures teachers effectiveness.

Research objective three

The scattered plot shows that there is a strong positive linear relationship between collaboration and communication and teacher's effectiveness which is confirmed by a Pearson's correlation coefficient of $r=0.293$. The regression model predicted 3.7% of the variance in teacher's

effectiveness. Thus the model is at good fit at $F(1, 39) = 8.469, P < .000$. The table above represents the ANOVA results which shows that the linear regression F test has the null hypothesis that collaboration and communication does not influence teacher's effectiveness. Given that $r = R^2 = 0$ with $F(1, 38) = 8.469, P < .000$, the test is highly significant. Implying that collaboration and communication has a statistically significant influence on teacher's effectiveness. The regression equation shows a statistically significant relationship between collaboration and teacher's effectiveness ($t = 6.542, p < .000$). The gradient coefficient for collaboration is .293. This means that the test is highly significant. The result also reveal that collaboration and communication at a constant of zero, teachers effectiveness will be at 4.490, meaning that any unit increase in collaboration and communication will lead to 0.211 increase in teachers effectiveness. At 5% level of significance and 95% competence and 0.000 level of significance, meaning that collaboration and communication has a statistically significant effect on teachers effectiveness.

Research objective four

The scattered plot shows that there is a positive relationship between professional development and teacher's effectiveness with Pearson correlation coefficient of $r = 0.245$. The regression model predicted 6.0% of the teacher's effectiveness variance. Therefore the goodness of fit for the data is $F(1, 38) = 15.426, p = 0.000$. The table above shows the results of F value. Professional development has a statistically significant effect on teacher's effectiveness with $F(1, 38) = 15.426, P < .000$, the test is highly significant. Therefore, we can conclude that there is a statistically significant effect of professional development and teacher's effectiveness. The regression results shows a significant relationship between professional development and teacher's effectiveness ($t = 11.171, p = 0.000$. the slope coefficient is 0.245. The results also reveals that professional development at a constant zero, teacher's effectiveness is 2.486. This implies that any unit increase in professional development will lead to 0.309 increase in teacher's effectiveness. At 5% level of significance and 95% level of confidence, professional development had a 0.000 level of significance, meaning that professional development has a significant effect on teacher's effectiveness

CHAPTER FIVE

DISCUSSION OF FINDINGS, SUGGESTIONS, PERSPECTIVES FOR FURTHER STUDIES AND CONCLUSION

The present chapter focuses on the discussion of the results of the findings, suggestions and perspectives for further studies. The discussion of the findings involves comparing the present results to that of other schools in the field.

Discussion of the results of the findings

The present section focuses on the discussion of the results of the findings. This encompasses pedagogy, technology accessibility, collaboration and communication and professional development.

Effect of pedagogy on teacher's effectiveness

The research objective one seeks to examine the effects of pedagogy on the effectiveness of teachers. The model summary indicates that there is a positive linear relationship between pedagogy and teacher's effectiveness. Therefore, the model is a good fit for the data. The F test carried out to determine the effects of pedagogy on the effectiveness of teachers. According to the linear regression F test states that the null hypothesis pedagogy does not statistically impact teacher's effectiveness, showing a significant test. Thus, we can conclude that pedagogy is statistically significant with teacher's effectiveness. The results further shows that pedagogy and teacher's effectiveness is statistically significant. Thus a slope coefficient for teacher's effectiveness is established, hence, pedagogy at a constant zero, teacher's effectiveness increases, which means that pedagogy has a statistically significant effect on teacher's effectiveness in some selected secondary schools in Yaounde VII.

The above results indicates that pedagogy influences the effectiveness of teachers in secondary schools in Yaounde. Pedagogy is the practice of teaching. Pedagogy is the art and science of teaching. It involves the theory and practice of how knowledge and skills are transmitted from one person to another. The theoretical part of pedagogy is the strict application of educational theories. This involves understanding how learners acquire knowledge, the different learning styles and how to create effective learning environments. This involves choosing and implementing appropriate

teaching strategies, designing curriculum, assessing students learning and adapting instruction to meet individual's needs. On the practical dimension, pedagogy entails the application of theoretical knowledge in real-world teaching situations. This involves choosing and implementing appropriate teaching strategies, designing curriculum, assessing students learning outcomes and adapting instruction to meet specific needs of students.

Pedagogy is generally seen as a determinant of teachers effectiveness as it provide the framework for them to use variety of teaching approaches to enhance students understanding. The effectiveness of a teacher therefore depends on his/her ability to use different teaching approaches interchangeably. This is because pedagogic approach used by a teacher depends on the context and the types of audience. It recognizes that teaching and learning occur within specific contexts, including in school, the community and the broader society. This implies that effective pedagogy must be sensitive to the cultural, social and economic factors that influence learning. Effective pedagogy consists of curriculum design which involves developing and organizing learning materials and experiences to achieve specific learning goals. Pedagogy also entails selecting and implementing teaching strategies that are effective for specific learning objectives and students. Pedagogy also involves classroom management which is all about creating a positive and productive learning environment which fosters student engagement and motivation. It involves building a positive relationship with students and fostering effective communication.

The effectiveness of a teacher therefore depends on his ability to make use of diverse teaching methods in a classroom. This is because the contexts are different and so too are learners. Teachers are thus required to integrate different pedagogical approaches in a classroom setting since its provides different possibility for students to learn. This involves the integration of the hybrid teaching method in classrooms. The hybrid teaching approach is the used of both the traditional and the modern methods of teaching in a class. This initiative will improve on students understanding and assimilation of classroom lectures. This helps to make the teacher very effective as students find it easier to assimilate lectures. Effective pedagogy is proportionate to effectiveness of teachers as it emphasis on teaching methods. It is thus crucial for creating high-quality learning experiences which engage students, promote deep understanding and lead to meaningful learning outcomes. It also ensures students success through the application of pedagogical principles, through which teachers can help students to develop their potentials, achieve their learning goals

and prepare for success in their future endeavors. This finding can be corroborated by the following studies.

Constructivism is a pedagogical approach that emphasizes the active construction of knowledge by students through their interactions with the learning environment. Several studies have highlighted the positive impact of constructivist approaches in utilizing ICT for teaching. For example, Fokides and Souliou (2015) found that constructivist teaching practices facilitated student engagement and collaboration when using ICT tools.

Hunzicker and Bradley, (2016), found out inquiry-based learning is another pedagogical approach that promotes student exploration and investigation of real-world problems or questions. Research suggests that ICT can enhance inquiry-based learning by providing students with access to a wide range of resources, tools, and simulations. This approach encourages students to be active participants in their learning process, fostering critical thinking and problem-solving skills.

In another study, Sahin et al., (2019), found out that blended learning, a combination of traditional face-to-face instruction and online learning, has also shown promise in integrating ICT effectively in teaching. Various studies have found positive effects of blended learning on student achievement, engagement, and motivation. The flexibility and personalized nature of blended learning enable teachers to incorporate ICT tools and resources to support differentiated instruction and meet diverse student needs.

Technology Pedagogical Content Knowledge (TPACK) is a framework that describes the knowledge that teachers need to integrate technology in their teaching. It consists of three main components: content knowledge, pedagogical knowledge, and technological knowledge, and their interactions (Mishra & Koehler, 2006). Content knowledge is the knowledge of the subject matter that teachers teach, such as concepts, facts, theories, and procedures. Pedagogical knowledge is the knowledge of the methods and strategies that teachers use to teach, such as instructional design, classroom management, assessment, and differentiation. Technological knowledge is the knowledge of the tools and resources that teachers use to support teaching and learning, such as computers, software, internet, and multimedia.

Effect of technology accessibility on teacher's effectiveness

The model summary shows a positive linear relationship between technology accessibility and teacher's effectiveness. Thus, the goodness of fit of the data. The F test. Was used to determine the effect of technology accessibility and teachers effectiveness. Technology accessibility has a

statistically significant effect on teacher's effectiveness with the test is highly significant. Therefore implying a statistically significant effect of technology accessibility on teacher's effectiveness. The results also shows that the coefficient of the technology accessibility on teacher's effectiveness with a statistically significant results. The results equally reveals that technology accessibility at a constant zero, teacher's effectiveness will increases. Meaning that technology accessibility has a significant effect on teacher's effectiveness.

In education, technology integration has become the concern of governments, educationists, policymakers, and educational community who sees the need of expanding access to quality education. The UNOs in its 2030 agenda of sustainable development advocates for lifelong learning opportunities for all irrespective of cultural background, geographical location, gender, age, race, and ethnic belongings. In order to meet up with this goal, technology has been seen as the appropriate mechanism through which quality education can be ensured for all. In Cameroon, since 2015, the government has multiplied efforts to ensure quality education for all the citizens no matter their location. One of this mechanism involves effective integration of technology into the education system. Although the efforts of the government are demands a lot of applaud, these efforts are pledged by a number of difficulties and obstacles. One of these obstacles include ensuring access to internet connectivity to all the secondary schools in the four corners of the country. The findings thus reveal that effective integration of technology in schools by teachers will improve students' performance and hence ensures teachers effectiveness. This result converges with other results on technology accessibility.

In a study by UNESCO, (2011), found out that technology accessibility is the extent to which ICT tools are available, affordable, and usable for teachers and students in schools Technology accessibility is influenced by various factors, such as infrastructure, equipment, policies, and support. Technology accessibility is also affected by the demand and supply of ICT tools, which can vary depending on the needs, preferences, and resources of teachers and students.

Goe, (2007), on his side found out that teachers' effectiveness is the extent to which teachers can facilitate student learning and achieve desired outcomes, such as academic achievement, motivation, and engagement. To measure teachers' effectiveness, various indicators can be used, such as student test scores, student surveys, classroom observations, and teacher self-reports.

In a similar study, Bingimlas, (2009), found out that the expected relationship between technology accessibility and teachers' effectiveness is positive, meaning that better technology accessibility leads to better teachers' effectiveness. However, this relationship may be mediated or moderated by various factors, such as the quality and suitability of ICT tools, the pedagogical integration of ICT tools, and the professional development of teachers. Therefore, it is important to examine how technology accessibility affects teachers' effectiveness in different contexts and conditions, and for different subjects and learners.

The SAMR model provides a useful lens for understanding and developing the use of technology in education. It also provides a tool for designing and evaluating curriculum and instruction for technology integration. The SAMR model can help teachers to reflect on their own use of technology, and to identify opportunities and strategies for enhancing or transforming their teaching and learning. The SAMR model can also help researchers and educators to investigate and measure the impact of technology integration on teaching and learning outcomes.

Effect of collaboration and communication on teacher's effectiveness

The result of the findings shows that there is a strong positive linear relationship between collaboration and communication and teacher's effectiveness. Thus, the model is at good fit. The results of the findings further shows that the linear regression F test has the null hypothesis that collaboration and communication does not influence teacher's effectiveness. The test is highly significant. Implying that collaboration and communication has a statistically significant influence on teacher's effectiveness. The regression equation shows a statistically significant relationship between collaboration and teacher's effectiveness. This means that the test is highly significant. The result also reveal that collaboration and communication at a constant of zero, teachers effectiveness increases, meaning that any unit increase in collaboration and communication will lead to an increase in teachers effectiveness. This means that collaboration and communication has a statistically significant effect on teacher's effectiveness.

Collaboration and communication are two intertwined concepts that are essential for success in any endeavor, whether it be in a personal, professional or academic setting. Collaboration is the act of working together with others towards a common goal. It involves sharing ideas, resources and responsibilities, combining efforts to achieve something greater than what could be accomplished individually. Communication is the process of exchanging information, ideas and feelings between two or more people.

Dillenbourg, (1999), found out that collaboration and communication are essential processes for teaching and learning, as they involve the exchange and sharing of information, ideas, and opinions among teachers and students, as well as with other stakeholders, such as parents, peers, and experts. Collaboration and communication can enhance learning by fostering social and cognitive skills, such as communication, cooperation, problem-solving, critical thinking, and creativity. Collaboration and communication can also improve teaching by enabling teachers to share best practices, provide feedback, and support each other's professional growth.

In another study by Garrison et al., (2000), found out that collaboration and communication are not easy to achieve, especially in the context of ICT integration in education. ICT tools can offer new opportunities and challenges for collaboration and communication, as they can facilitate and enrich the interaction and dialogue among teachers and students, as well as with other stakeholders, in online and offline settings. However, ICT tools can also pose barriers and difficulties for collaboration and communication, such as technical issues, privacy concerns, and social isolation. Goe, (2007), found out that teachers' effectiveness is the extent to which teachers can facilitate student learning and achieve desired outcomes, such as academic achievement, motivation, and engagement. To measure teachers' effectiveness, various indicators can be used, such as student test scores, student surveys, classroom observations, and teacher self-reports.

Hargreaves, (2000), found out that the expected relationship between collaboration and communication and teachers' effectiveness is positive, meaning that better collaboration and communication lead to better teachers' effectiveness. However, this relationship may be mediated or moderated by various factors, such as the quality and frequency of collaboration and communication, the type and purpose of collaboration and communication, and the skills and attitudes of teachers and students. Therefore, it is important to examine how collaboration and communication affect teachers' effectiveness in different contexts and conditions, and for different subjects and learners.

The constructivist theory also recognizes the social and cultural nature of learning. Learners interact and collaborate with others, such as peers, teachers, and experts, to share and co-construct knowledge and understanding. Learners also participate in authentic and meaningful tasks and contexts that reflect the real-world problems and practices of their discipline and community.

Learners also receive scaffolding and guidance from others, such as modeling, questioning, and feedback, to support their learning and development.

Effect of profession development on teacher's effectiveness

The results of the findings shows that there is a positive relationship between professional development and teacher's effectiveness. Therefore, the goodness of fit for the data. The findings further shows the results of F test. Professional development has a statistically significant effect on teacher's effectiveness. The test is highly significant. Therefore, we can conclude that there is a statistically significant effect of professional development and teacher's effectiveness. The regression results shows a significant relationship between professional development and teacher's effectiveness. The results also reveals that professional development at a constant zero, teacher's effectiveness increases. This implies that any unit increase in professional development will lead to an increase in teacher's effectiveness, meaning that professional development has a significant effect on teacher's effectiveness.

The transfer and application of learning are influenced by various factors, such as the quality and relevance of professional development, the support and incentives for teachers, and the context and conditions of the classroom and the school. The transfer and application of learning can also be facilitated or hindered by the attitudes and behaviors of teachers, such as their motivation, confidence, and commitment to change and improvement (Lawless & Pellegrino, 2007). According to the literature, some of the factors that facilitate or hinder the transfer and application of learning are:

Desimone, (2009), found out that the quality and relevance of professional development affect the transfer and application of learning, as they determine the extent to which teachers perceive the value and usefulness of what they learned, and the extent to which what they learned is aligned with the goals and standards of the curriculum and the school. High-quality and relevant professional development can facilitate the transfer and application of learning, as it can increase teachers' satisfaction and interest, and provide them with coherent and applicable knowledge and skills. Low-quality and irrelevant professional development can hinder the transfer and application of learning, as it can decrease teachers' satisfaction and interest, and provide them with inconsistent and impractical knowledge and skills.

In another study by Darling-Hammond et al., (2017), found out that the support and incentives for teachers affect the transfer and application of learning, as they determine the extent to which

teachers receive the necessary resources and feedback to implement what they learned, and the extent to which teachers are recognized and rewarded for their efforts and achievements. Adequate support and incentives for teachers can facilitate the transfer and application of learning, as they can provide teachers with access, guidance, and recognition, and motivate them to change and improve their practices. Inadequate support and incentives for teachers can hinder the transfer and application of learning, as they can create barriers, challenges, and conflicts, and discourage them from changing and improving their practices.

Kraft et al., 2018), found out that the context and conditions of the classroom and the school affect the transfer and application of learning, as they determine the extent to which teachers have the opportunity and flexibility to apply what they learned, and the extent to which teachers face the pressure and expectations to perform and achieve. Favorable context and conditions of the classroom and the school can facilitate the transfer and application of learning, as they can create a conducive and supportive environment for teachers to experiment and innovate, and to monitor and evaluate their practices. Unfavorable context and conditions of the classroom and the school can hinder the transfer and application of learning, as they can create a restrictive and unsupportive environment for teachers to experiment and innovate, and to monitor and evaluate their practices.

Suggestions/recommendations

The present study seek to examine the impact of technology integration on teacher's effectiveness in some selected secondary schools and colleges in Yaounde VII subdivision. The researcher collected data through a closed ended questionnaire which was analyzed using statistical data analysis techniques precisely the simple linear regression. The findings shows that technology integration has a statistically significant effect on teacher's effectiveness in secondary schools and colleges. On the basis of this result, a number of recommendations and suggestions were developed and directed towards educationists, policymakers, school authorities, educational planners, professionals and experts in education as well as educational community. The following are the suggestions of the study.

- The results of the findings revealed that pedagogy used by teachers in classrooms in secondary schools and colleges is a determinant of teacher's effectiveness. Pedagogy is the process which involves the transmission of knowledge, skills and competences from one person to another. It has been proven that pedagogy plays a vital role in teachers

effectiveness. The teacher are said to be at the center of knowledge transmission. On the of this result, we therefore recommends that the government, policy makers, educational planners and school authorities should revise and refine the teaching methods in schools. This requires school authorities to ensure the shift from the teacher-centered teaching method to the learner centered teaching method. The advantage of the student-centered teaching lies in the fact that it provides an opportunity for learners to participate in the process of knowledge construction. By implementing the competence based approach to teaching, the project based approach and the problem based approach, it will help enhance the effectiveness of teachers.

- The results of the findings also revealed that technology integration remains an integral part of the teacher's effectiveness. It is proven that technology integration influences teacher's effectiveness in secondary schools and colleges. The introduction of e-learning has intensify the quest for access to technological tools in school. On the basis of this result, it was recommended that teachers should adopt the blended or hybrid teaching methods in class. The provision of technological resources will go a long way to solve a number of problems in real life situations.
- The results of the findings further revealed that collaboration and communication is a determinant of teacher's effectiveness in secondary schools and colleges. The findings shows that collaboration and communication exerts a positive and strong influence on teacher's effectiveness in secondary. It is on the basis of this result that we suggest that teachers, school administrators and students must collaboration and communicate between themselves so as to enhance smooth integration of technology in education. Communication and collaboration are important tools of effective decision making in organizations. By communicating and collaborating with everybody in school including the students, it facilitates the use of digital tools and resources in school. By so doing, it will increase students' performance as well as the overall school performance and thus teachers effectiveness.
- The result of the findings equally show that professional development is a correlate of teacher's effectiveness. It reveals that professional development exerts a strong and positive influence on teacher's effectiveness in secondary schools and colleges in Yaounde. This is

so because professional development provide an opportunity for teachers to improve themselves professionally. On the basis of this finding, we suggests that teachers should be given opportunities of growth and development. This involves organizing pedagogic seminars and workshops to recycle teachers on the recent innovations and advancements in their field. As such, effective technology integration in secondary schools and colleges requires that teachers should be trained on the new approach of teaching which is the blended teaching. Through pedagogic seminars and workshops, teachers will be trained on how to use digital tools and resources. This will go a long way to ensure their effectiveness in performing their profession.

All these recommendations, if they are effectively implemented by educationists, governments, policymakers, educational professionals and experts, school administrators, teachers and students as well as the educational community will go a long to improve on teachers effectiveness in technology integration in secondary schools and colleges in Yaounde VII in particular and Cameroon in general.

Perspectives for future research

This study addressed the problem of ineffectiveness of teachers in technology integration in secondary schools and colleges in Yaounde VII subdivision. The study adopted a purely quantitative research approach and focused on secondary schools and colleges in Yaounde VII subdivision. As such, future research work can be envisaged on the same topic to better understand how technology integration in schools is a correlate of teacher's effectiveness. The following are possible areas under which future studies can be conducted.

- The present study addressed the problem of teacher's effectiveness in relation to the integration of technology in secondary schools and colleges in Yaounde VII. The study only focused on the demise of teachers Yaounde VII. It is thus, envisaged that an open study should be conducted involving other schools and colleges in the rural parts of the country.
- The present study also focused on only English language teachers. A broader study should be conducted on all teachers in all disciplines to get more insights on how technology integration affects teacher's effectiveness.

- Also, the present study adopted a quantitative approach to determine the link between technology integration and teachers effectiveness in secondary school and colleges. Thus, a qualitative and even a mixed study research is envisaged to better get more insights into the problem of teacher's effectiveness as a result of technology integration.

Constraints and limitations

In every scientific exercise, there are always a number of obstacles and constraints which generally stand in the way of the researcher as he navigates towards the end of the project. The success of the project therefore depends on the ability of the researcher to effectively mitigate the obstacles which he faces. In the course of this study, the researcher encountered a number of difficulties ranging from the availability and accessibility of participants to financial difficulties. In terms of the availability and accessibility of the participants, the researcher finds it difficult to access the participants during field. This was because the field work was conducted during a time most teachers were preparing for end of year exams. So, it proves to be challenging for the researcher to access the participants which affected the sample size of the study. Also, the researcher was faced by the problem of insufficient documentation on the topic addressed. The library which were visited did not provide us with current and sufficient documentation on the topic. The researcher had to search for articles and books online which equally prove to be challenging since most of the books and articles were payable.

The researcher also faced the problem of administrative bottlenecks. Conducting a study in secondary schools and colleges did not prove to be easy since the researcher had to wait for a long time to be accepted to conduct fieldwork. The researcher also faced the problem of the return rate of the questionnaire. All the questionnaires sent out were not collected. We had to reprint the questionnaires and administer again. We also faced the financial challenge.

CONCLUSION

Technology integration is the process of thoughtfully incorporating technological tools and resources into teaching and learning process to enhance student engagement, support diverse needs and improve educational outcomes. Technology integration is not just the matter of using technology for technology sake but about strategically integrating it to achieve specific learning goals. The world has been experiencing a global transformation caused by recent advancements and innovations in the field of technology. The world has become a global society thanks to the integration and effective use of technological resources and tools in day today life. Today, it is practically impossible to do without technology. This situation has affected all aspect of social, political; economic; and cultural life including educational life. In the midst of crisis of different nature and magnitude, technology has been seen by governments, educationists, policymakers, planners, and educational authorities as the only means through which quality education for all can be achieved. Cameroon since 2000s, has embarked on a vast campaign of digitalizing the educational system. These efforts are intended to ensure student engagement, support diverse learning, and improve educational outcomes and teacher's effectiveness. Despite these efforts, the expectations regarding teachers effectiveness as a result of technology integration is far from being achieved.

The aim of this study was to examine the impact of technology integration on the effectiveness of teachers in secondary schools and colleges in Yaounde VII subdivision. The study comprised of five chapters with chapter dwelling on the introduction, chapter on the literature review, chapter three on the methodology, chapter four on data analysis and chapter five on discussion of findings. The work also includes references and appendix.

The study addressed the problem of teacher's ineffectiveness as a result of poor integration of technology in secondary schools and colleges in Cameroon. To solve this problem, the study adopted a purely quantitative research approach. The study was conducted in the center region of Cameroon, Yaounde, Mfoundi division and precisely in Yaounde VII subdivision. The study targeted a total of three schools from which a sample of 40 participants were randomly selected for the study. As such, a closed ended questionnaire was administered to the participants of the study which helped to collect valid and reliable data. For the data analysis techniques, the

descriptive and inferential statistics specifically the simple linear regression analysis was used to analyze the data in this study. The analysis of the data resulted to the following results.

In the first hypothesis, the independent variable was regressed on the dependent variable, at the end of which it was revealed that pedagogy exerts a significant effect on the effectiveness of teachers in schools. In the second hypothesis, technology accessibility was regressed against teacher's effectiveness which revealed that teacher's effectiveness is significant influence by technology accessibility. The third research hypothesis revealed that collaboration and communication exerts a significant effect on teacher effectiveness in secondary schools and colleges. In the fourth and final research hypothesis, the findings revealed that professional development significantly influence teacher effectiveness. All the research hypotheses were confirmed which means that technology integration exerts a statistically significant effect on teacher effectiveness in secondary schools and colleges in Cameroon.

On the basis of this result, a number of recommendations and suggestions were developed and directed towards educationists, policymakers, school authorities, educational planners, professionals and experts in education as well as educational community. The following are the suggestions of the study. This involves improving pedagogical practices in secondary schools and colleges, providing internet connectivity, enhancing effective collaboration and communication and providing opportunities for growth and development. Also, perspectives for further studies were equally envisaged.

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APPENDIXES

Appendix 1: Research authorisation

REPUBLIQUE DU CAMEROUN ***** Paix – Travail – Patrie ***** UNIVERSITE DE YAOUNDE I ***** FACULTE DES SCIENCES DE L'EDUCATION ***** DEPARTEMENT DE CURRICULA ET EVALUATION		REPUBLIC OF CAMEROON ***** Peace – Work – Fatherland ***** THE UNIVERSITY OF YAOUNDE I ***** THE FACULTY OF EDUCATION ***** DEPARTMENT OF CURRICULUM AND EVALUATION
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Le Doyen
The Dean
N° 23/UYI/VDSSE/

AUTORISATION DE RECHERCHE

Je soussigné, **Professeur BELA Cyrille Bienvenu**, Doyen de la Faculté des Sciences de l'Education de l'Université de Yaoundé I, certifie que **MEFFO Ulriche Farida**, Matricule **21V3834**, est inscrite en Master II à la Faculté des Sciences de l'Education, **DEPARTEMENT DE CURRICULA ET EVALUATION** Filière : **MANAGEMENT DE L'EDUCATION**, Option : **GESTION DES SYSTEMES D'INFORMATION**.

L'intéressée doit effectuer des travaux de recherche en vue de la préparation de son diplôme de Master. Elle travaille sous la direction du Pr **MAINGARI Daouda** Son sujet est intitulé: « *Intégration pédagogique des TIC dans l'enseignement secondaire au Cameroun et performance des élèves : cas des lycées d'ESG de Yaoundé VII* ».

Je vous saurai gré de bien vouloir la recevoir et mettre à sa disposition toutes les informations susceptibles de l'aider dans son travail.

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

Fait à Yaoundé, le **17 01 23**


Pour le Doyen et par ordre
Dr. Mbembe Gnanzi

Appendix 2: Questionnaire

QUESTIONNAIRE FOR TEACHERS

Dear respondent,

I am conducting a research study on the topic of "Technology pedagogic integration and teachers effectiveness in selected secondary schools of Yaounde 7" as part of Master's program in the department of... at the University of Yaounde I. I kindly request your participation in completing a questionnaire that has been designed specifically for this research. The questionnaire is divided into four sections : A, B, C and D. The questions and items included in the questionnaire are solely for academic purpose, and your honest and objective responses will help ensure the accuracy of the findings. Please be assured that all information shared will be treated with the strictest confidentiality. Your identity will remain anonymous, and the data collected will be used exclusively for research purpose.

Your time and cooperation in completing this questionnaire would be greatly appreciated. Should you have any questions or concerns, please do not hesitate to contact me. Thank you in advance for your support.

Best regard,

Meffo Farida

Departement of

University of Yaounde I

Section I : DEMOGRAPHIC INFORMATION

I. Please, answer the following :

1. Full name of school : _____
2. Region of origin : _____
3. Class (es) you teach : _____

II. Tick (✓) besides the choice (s) that best describes you.

4. Your age range : 16 - 20. 21 - 25. 26 - 30. 31 - 40. 40 >
5. Highest Qualification : a) A Level b) Grade 1 Certificate c) Diploma/HND in Education d) BA / BTech e) MA/MED f) PhD
6. Number of years in teaching : a) less than 1-year b) 1-3 years c) 4-6 years d) 7-10year e) 11-14 years f) 15 year or more

Section II : INTEGRATION OF TECHNOLOGY AND TEACHERS' EFFECTIVENES

Please indicate the extent to which you agree with this following Statement by placing a tick (✓) in any of the boxes for each row

1= Strongly Agree, 2=Agree, 3= Neutral, 4=Disagree, 5= Strongly Disagree



Section A : PEDAGOGY HAS AN IMPACT ON TEACHERS' EFFECTIVENESS

NO	Statement	SA	A	N	D	SD
1.	Using technology in my teaching enhances the effectiveness of my lessons					
2.	I feel confident in integrating technology into teaching practices.					
3.	Technology helps me cater to different learning / styles in my classroom					
4.	Implementing innovative pedagogical strategies improves my effectiveness as a teacher.					
5.	I believe that incorporating technology in my instruction improves student engagement and participation.					
6.	Technology helps me cater to different learning abilities in my classroom.					

Section B : technology accessibility has an impact on teachers' effectiveness

No	Statement	SA	A	N	D	SD
7.	The availability of technology resources in my school is sufficient for effective teaching					
8.	I have access to technological resources that support my teaching goals.					
9.	The technology infrastructure in my school is reliable and well-maintained.					
10.	I can easily access and use software and applications that enhance my teaching.					
11.	The school administration provides adequate support and training for utilizing technology in the classroom.					
12.	I have access to technological tools that support my teaching goals.					

Section C : Collaboration and communication

No	Statement	SA	A	N	D	SD
13.	Collaborating with colleagues on technology integration projects enhances my teaching effectiveness.					
14.	I actively seek opportunities to share and learn from other teachers' experiences with technology.					
15.	Technology enables effective communication with students and their parents.					
16.	I feel supported by my colleagues in my efforts to integrate technology in my teaching.					
17.	Collaborative platforms and tools facilitate efficient and meaningful communication among teacher, students, and parents.					
18.	Technology enables effective communication with parents					

Section D : Professional development

19.	I participate in professional development programs that enhance my knowledge and skills in technology integration.					
20.	I participate in professional development programs that enhance my knowledge and skills in technology integration.					
21.	The school provides regular opportunities for professional growth in the area of technology integration.					
22.	I feel adequately prepared to use technology effectively in my classroom.					
23.	Attending workshops and conferences on technology integration has a positive impact on my teaching effectiveness					

