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Effects of Information and Communication Technology Management on Public Teachers' Professional Development in Rwanda: A Case of Rubavu District

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Abstract: **This study explored the impact of Information and Communication Technology (ICT) management on the professional development of public primary school teachers in Rubavu District, Rwanda. Using a descriptive research design, data were collected through questionnaires and interviews from 174 participants across eight schools representing rural, urban, and semi-urban areas. The findings, analyzed using SPSS, showed that ICT positively influences teaching by enhancing lesson delivery, promoting interactive learning, and enabling better communication and collaboration among educators. A strong correlation was found between the availability of ICT tools and professional growth (calculated value = 71.122, at a 90% significance level). Furthermore, ICT competence and training (r = 0.522, p = 0.000), as well as positive teacher attitudes toward ICT integration (r = 0.820, p = 0.000), significantly contributed to professional development. The study concludes that ICT plays a vital role in equipping teachers with modern skills through access to digital tools, internet connectivity, and ongoing training. It recommends increased investment by the Ministry of Education in ICT infrastructure and the organization of regular in-service training, along with community engagement to boost ICT access. Future research should investigate the impact of ICT on student academic performance in both public and private primary schools.**

Keywords: **Information, Communication Technology, Management, Public Teachers, Professional Development, Rwanda.**

I. INTRODUCTION

Schools utilize a diverse array of ICT tools to generate, communicate, distribute, save, and manage information in today's rapidly evolving landscape. According to UNESCO (2023), when educators possess ICT training and digital literacy, students are more likely to develop higher-order thinking skills, adopt unique and creative methods of articulating their understanding, and become better equipped to navigate the continuous technological changes prevalent in both the workplace and society. In fact, ICT gives teachers access to a wealth of online materials, instructional tools, and professional development opportunities that enhance students' academic achievement and readiness for life after graduation.

A country's progress is mostly driven by its teachers, who emphasize the importance of ongoing professional development to fulfill the ever-changing demands of education (Abdul, K. & Iftikhar, A., 2018). Traditional teaching methods are increasingly perceived as inadequate in addressing the evolving needs of students and the education system at large. To bridge this gap, there is a growing consensus on the importance of empowering teachers with modern technological tools and pedagogical approaches. As a result, UNESCO envisaged initiatives like the ICT in Education Program focus on promoting the development of high-quality Open Educational Resources (OERs) that teachers can utilize for lesson planning and self-directed learning (UNESCO, 2023).

Findings from studies discovered that the use of ICT in collaborative learning environments enhances student engagement by providing opportunities for active participation, peer interaction, and knowledge co-construction. According to a study conducted in Finland, students who engage in collaborative online activities demonstrate higher levels of motivation, enthusiasm, and intrinsic interest in learning, leading to improved learning outcomes and academic achievement (Jang et al., 2020). As such, addressing digital divides through equitable access to technology-enhanced learning resources contributes to more inclusive and accessible educational environments (Eynon et al., 2020).

Teachers' teaching skills are improved when information and communication technology (ICT) is incorporated into professional development programs. According to Singaporean studies, instructors who got ICT support and training expressed more confidence and competence in utilizing technology to improve their teaching strategies and aid students' learning (Chai et al., 2014, Niemi et al. 2019). In addition to this by providing opportunities for ongoing training, collaboration, and reflection, ICT-enabled professional development programs empowered teachers to stay updated with emerging technologies and pedagogical approaches, fostering their professional growth and adaptability in a rapidly changing educational landscape.

Indeed, by gaining proficiency in using ICT tools and pedagogical approaches, teachers-in-training are better equipped to create engaging and interactive learning experiences that leverage technology to support student-centered and personalized learning approaches. While emphasizing on the promotion of quality and sustainability of academic excellence in schools, Lee and Lee (2021) explore that the role of leadership and organizational culture in fostering a supportive environment for ICT integration is paramount. For them, strong leadership, coupled with a positive and innovative organizational culture, significantly influenced teachers' attitudes and practices related to ICT use. It is through this collaborative professional learning and peer support networks that the potential of technology, particularly in disseminating quality lesson plans and enhancing teacher training, lead to significantly improved student learning outcomes (Zeitlin & Jonathan, 2018).

That is why schools with visionary leaders who articulated a compelling vision for technology-enhanced learning and provided strategic guidance and resources for implementation were more successful in fostering a culture of innovation and experimentation among teachers. Most African nations have revamped their ICT policies to align with broader national development goals, ensuring that teachers are enabled to overcome challenges that impede them from having access to relevant information and resources for professional growth, (Kemmis, 2016).

These challenges include limited access to relevant digital resources, inadequate infrastructure and technology tools, insufficient ICT training and support for teachers, and a lack of clear guidelines and policies for ICT integration in education. In the same line, Gasana and Rugambuka (2022) identified several limitations related to ICT integration in teacher professional development in Rwandan public primary schools. Enhancing the standard of education, skill development, and innovation is one of the top priorities of South Africa's new development plan, the National Development Plan (Vision 2030) (NDP). The NDP, in particular, believes that ICT will support a vibrant, inclusive, and successful knowledge economy where smooth information systems and infrastructure will satisfy the demands of the public sector, private sector, and citizens (Greunen, 2021).

In Kenya, to respond to the country ‘s Vision 2030, the Teacher Service Commission (TSC) reviewed 2010 ICT policy in 2020 to respond to government directives for all government institutions to be digitalized to address technological changes and adopt new service delivery practices. The 2020 TSC ICT strategy seeks to guarantee that educators can obtain the information they require, particularly when it concerns their line of work and in times of emergency. If correctly implemented, lifelong learning can help teachers and other workforce members reskill and upskill, which would eliminate skills shortages and redundancies (TSC, 2020). Under the auspices of the UNESCO-China Funds-in-Trust (CFIT) Project for Enhancing Teacher Education to Bridge the Education Quality Gap in Tanzania, the Ministry of Education and Vocational Training (MoEVT) in partnership with the UNESCO Dar es Salaam Office has updated the ICT Competency Standards for Teachers in Tanzania to give Tanzanian educators the skills they need to succeed in the twenty-first century.

The standards were created in accordance with the 2014 Education and Training Policy, which aims to create competent human resources capable of advancing and supporting the national development goals (MoEVT, 2015). In order to address issues with ICT use in schools, the Rwanda Basic Education Board (REB) created a department whose mission is to harness the innovative and cost-effective potential of high-quality educational technology tools and resources for knowledge creation and deepening and integrating 21st century learning skills (Rwanda Basic Education Board, 2022).

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According to Gasana and Rugambuka (2022) various opportunities for enhancing ICT integration in teacher professional development were put in teachers' disposal including to provide teachers with access to relevant digital resources, such as online training modules, educational websites, and instructional materials, to support their ongoing learning and development. This was also a reaction to the need for ongoing mentoring and support programs to assist educators in developing their ICT proficiencies and successfully incorporating technology into their lesson plans.

Additionally, studies by Uwamahoro and Mupenzi (2023) highlight the potential of ICT-enabled pedagogies, particularly blended learning approaches, in improving teaching effectiveness and student outcomes in Rwandan classrooms. They found that blending traditional face-to-face instruction with online learning activities and resources can enhance student engagement, promote personalized learning experiences, and facilitate teacher-student interaction and feedback. Uwamahoro and Mupenzi emphasized the importance of supporting teachers in developing their ICT competencies and pedagogical skills to effectively integrate blended learning approaches into their teaching practices.

Professional development programs that provide teachers with training, guidance, and resources for implementing blended learning models can help enhance their teaching effectiveness, adaptability, and confidence in using technology to support student learning. The importance of education is emphasized in Rwanda's Vision 2050, especially in terms of giving educators the abilities and information they need to promote socioeconomic change. Rwanda has included ICT into its educational programs, acknowledging its transformative potential and seeing it as a tactical instrument for attaining sustainable development. Initiatives like the ICT essentials for teachers, developed by MINEDUC in 2017, underscore Rwanda's commitment to leveraging technology for teacher professional development. By aligning with UNESCO's ICT competency framework for teachers, this initiative aims to equip educators with the requisite skills to navigate the digital landscape, access online learning resources, and collaborate with experts, thereby enhancing their professional growth.

Against this background, this study seeks to explore the effect of information and communication technology on the professional development of teachers in Rwanda, with a specific focus on the Rubavu district. By examining the effectiveness of ICT integration in enhancing teacher competencies, this research aims to contribute to ongoing efforts aimed at fostering a cadre of educators capable of delivering high-quality education in line with Rwanda's development aspirations. The main objective of this study was to examine the effects of using Information and Communication Technology (ICT) On Teachers' Professional Development in Public Primary Schools of Rwanda.

II. CONCEPTUAL FRAMEWORK

A construct that a researcher develops to show the relationship between variables is called a conceptual framework. The study's conceptual framework outlines how it would evaluate the connection between Rwandan public primary school teachers' professional growth and the ICT resources they use.

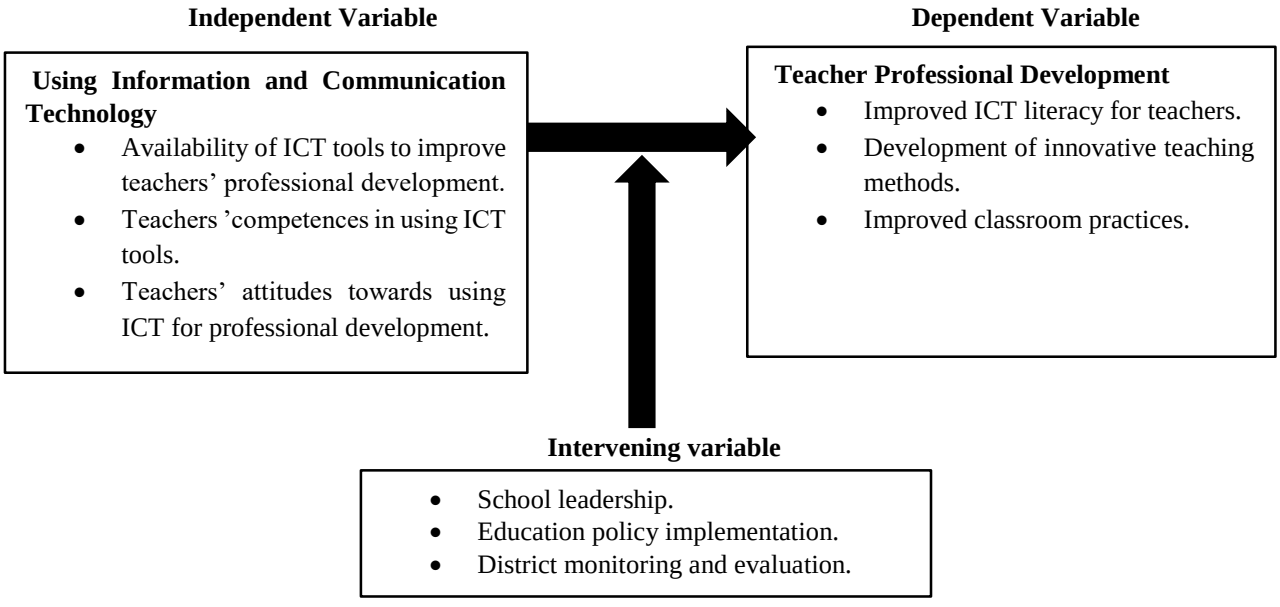

Figure 2.2: Conceptual Framework

Source: The researcher (2025)

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The researcher demonstrates the relationship between the independent factors (using ICT) and the dependent variable (teacher professional development) through the conceptual framework shown in Figure 2.2. The use of ICT by educators has an impact on their professional growth. The availability of ICT tools, teachers' proficiency with ICT tools, and teachers' attitudes toward using ICT for professional development are all elements that go hand in hand with ICT usage. Other intervening factors include district monitoring and evaluation, school leadership, and the application of education policies.

III. RESEARCH METHODOLOGY

Research Design

The researcher used a descriptive research design.

Target Population

This particular study is targeting the teachers and head teachers of primary schools in Rubavu district but was purposively limited to 8 schools from three sectors namely, Gisenyi, Nyamyumba and Kanzenze based on their social economic statuses and geographical location; urban, semi-urban and rural locations. In total, the target population was 177 teachers and 8 head teachers, thus (N=185).

Sampling Design

The researcher used purposive sampling. The researcher selected eight schools from three sectors; one sector being rural, the next sector is urban and the third is semi urban. Among the eight schools, four have a computer lab and four others have no computer lab.

Sample Size

The sample size for the research on the impact of ICT use on teacher professional development in Rwandan public primary schools was determined by considering the 185 respondents who make up the target population. Ben (2021) claims that the sampling frame, or research population as a whole, is used to determine the sample size. Therefore, the sample size was calculated with the Slovin's formula, $n = \frac{N}{1+N(e)^2}$, whereby: n=sample size, N= population size and e= the margin error (0.05). Consequently, there were 185 respondents in the study's overall population, and 174 respondents made up the sample size.

IV. RESEARCH FINDINGS AND DISCUSSION

Demographic Characteristics of Respondents

By examining respondents' sex, age, education profile, marital status, and years of employment in the educational sector, the study aimed to analyze their demographic data.

Gender of Respondents

The teachers and head teachers' demographic information comprise of sex and their form as recapitulated in Table 1

Table 1: Gender of Respondents

Gender of Respondents	Male Number	Percentage	Female Number	Percentage
School Head Teachers	4	50.0	4	50.0
Public Primary School Teachers	132	76.5	40	23.5

Source: Primary Data (2024)

Results demonstrated that 50.0% of school head teachers are male while 50.0% are female. In the same vein, among 172 public primary school teachers 132 (76.5%) were male. While 40 (23.5%) were female. Therefore, as specified by the constitution of the republic of Rwanda, therefore female emancipation in public primary schools remarked an interesting progress.

2. Presentation of Findings

The present section presents data collected on the level of teacher's professional development attained due to ICT available in public primary schools, the effect of ICT tools available on teachers 'professional development in public primary schools, effect of competencies and training in using ICT on professional development, and effect of teacher's attitude towards the use of ICT tools on professional development of teachers in public primary schools in Rwanda.

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Public Primary Teachers' Professional Development In Rwanda

The researcher determined the perception of teachers on their level of professional development due to the use of ICT. In this regard, the researcher measured professional development using the following aspects: improvement in ICT literacy for teachers, development of innovative teaching methods, and improving classroom practices. A five Likert scale was adopted to assess respondent's perception as follows: 1=Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree.

Table 2: Public Primary Teachers' Professional Development in Rwanda

Statements	Strongly Disagree %	Disagree %	Neutral %	Agree %	Strongly Agree %	Mean	Std
Improved ICT literacy for teachers.	2.1	2.1	15.0	18.6	62.1	1.84	1.250
Development of innovative teaching methods.	0.0	10.0	10.7	17.9	61.4	2.05	1.375
Improved classroom practices	2.1	2.1	4.3	14.3	77.1	1.42	.968

Source: Source: Primary Data (2024)

Results presented in Table 2 demonstrated 62.1% of respondents strongly agreed while 18.6% of respondents have a positive perception concerning an improvement in ICT literacy for teachers in their schools. Moreover, 61.4% of respondents strongly agreed and 17.9% of respondents revealed the development of innovative methods in their teaching process, 77.1% of respondents strongly agreed, and 14.3% of respondents agreed with an improvement in their classroom teaching practices.

When the researcher interviewed head teachers, *they all remarked "In my school, most of teachers have completed all content in the syllabus due to the availability of ICT tools and this helped our teachers to perform well. In this regard, the number of teachers have improved their ICT literacy, developed their innovative teaching methods as well as classroom practices.*

The current study supports the findings of Washington (2020), who proposed that instructors should get ongoing professional development with ICT-related competencies and that adequate and continual financial input is the necessary material base. Furthermore, the appropriate software tools must to be made available and integrated into the curriculum.

Effect of the ICT Tools Availability on Teachers 'Professional Development

Objective one of the studies examined the ICT tools available for teachers 'professional development in public primary schools in Rwanda. Computers (laptops and desktops), projectors, tablets, reliable internet, and smartphones were the most often used ICT instruments for teachers' professional development. SD (strongly disagree), D (disagree), A (agree), and SA (strongly agree) were used to score the respondents' viewpoints. The corresponding values for these ratings were 1, 2, 3, and 4.

Table 3: Teachers' Perception on the Availability of ICT Tools

Statements	Strongly Disagree %	Disagree %	Neutral %	Agree %	Strongly Agree %	Mean	std
In my school there are computers (laptops and desktops) that I can use for professional development	1.1	1.1	16.0	17.0	64.9	1.45	1.080
My school has a projector that I can use to improve my teaching practice	1.1	8.5	9.6	26.6	54.3	1.68	1.002
My school has tablets that are readily available for professional learning	1.1	1.1	2.1	17.0	78.7	1.53	1.080
In my school there is a stable internet that can be used for Teachers for Professional learning	0.0	8.5	9.6	18.1	63.8	1.15	.340
I have a smartphone that I can use for professional development	1.1	5.3	13.8	25.5	54.3	1.72	1.174

Source: Primary Data (2024)

Data indicated that 64.9 of respondents strongly agreed and 17.0% of respondents agreed that teachers there are computers (laptops and desktops) that they can use for professional development, 54.3% of respondents strongly agreed and 54.3% of respondents strongly agreed, 25.5% agreed that their schools have a smartphone that I can use for professional development, 63.8% strongly agreed, 18.1% agreed that their schools have a stable internet that teachers can use for professional learning while using ICT in the classroom, and 26.6% agreed that their schools have a projector that I can use to improve my teaching practice. Additionally, 78.7% of respondents strongly agreed and 17.0% agreed that their schools have tablets that are readily available for professional learning. The researcher gathered qualitative data in order to ascertain how the availability of ICT tools affected the professional development of teachers in public elementary schools in the Rubavu District. Head instructors at Interview 8 attest to this.

One head teacher reported the following statement: "T*he use of new ICT tools has encouraged both teachers to be creative in this school, when they have full access to internet and use of online platforms for teaching activities, mostly teaching applications, virtual classrooms, and computer devices have stimulated interaction or discussion between teachers and learners"*

Moreover, *other head teachers importantly argue "the use of ICT tools help our teachers to do assignment and other academic tasks, in have organized training in ICT use in order to facilitate our teacher to acquire skills to give our students*".

The present study findings are relevant since they concur with the work of Riasati, Allahyar & Tan (2022) who argued that 52 Edna Adan University teachers participated in this study, with 46% female and 54% male. More than 50% of the attendees concurred that experiential teachers improved their engagement and made the material easier for them to absorb. Fifty-six percent said they were excited to use what they learnt for their thesis.

Table 4: Pearson Correlation Analysis

		Primary teachers' professional development
Availability of ICT Tools	Pearson Correlation	1
	Sig(2-tailed)	
	N	172
Primary teachers' professional development	Pearson Correlation	.784**
	Sig.(2-tailed)	.000
	N	172

Source: Primary Data (2024)

Correlation coefficient and the p-value demonstrate the existence of significant effect of availability of ICT tools on Primary teachers' professional development. Therefore, ICT is a way of improving Primary teachers' professional development. Instead of using them as assistants for typesetting and other exercises associated with word handling exercises, they should be provided the proper programming, valid affiliation with basic organization, and considerable access to obtain a lot of resources from outside of school. Although studies have frequently tried to define what ICT sufficiency implies for teaching, they have not looked at how certain ICT tools undoubtedly affected teachers teaching outcomes (Davis, 2023).

Table 5: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	355.609	3	71.122	149.196	.000[a]
	Residual	81.992	169	.477		
	Total	437.601	172			

a. Predictors: (Constant), computers, projector, tablets, stable internet, smartphone.

Source: Primary Data (2024)

Regression analysis on availability of ICT tools evidenced that the value of f-statistics was well equipped, computers, projector, tablets, stable internet, smartphone influence level of teacher's professional development. The calculated value was 71.122 and all have a strong correlation between availability of ICT tools and higher level of professional development

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of teachers at 90%. Availability of ICT resources can increase teaching quality by lowering the number of incompetent teachers (Thiele, Mai & Post, 2024). The present study is in line with the work of Gaikwad and Tankhiwale (2024) who demonstrated that ICT tools can successfully transmit information to learners. Additionally, having adequate ICT tools can help students take use of their considerable flexibility to find information for educational purposes and enhance teaching through ICT tools (Riel, 2022).

Table 6: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	sig	95% CI for B	
	Beta	Std. Error	Beta			Lb	UB
(Constant)	.138	.037		2.675	.010	.025	. 175
Doing Methods	.327	.018	.350	17.875	.000	.290	.364

a. Dependent Variable: Teachers professional development

b. Predictors: Constant, Availability of ICT Tools

Source: Primary Data (2024)

The results showed that the availability of ICT tools plus the degree of professional development of teachers equaled 0.138. The study looked at how teachers' professional growth was affected by the availability of ICT technologies. With b=.327, t=17.875, p=-value=0.000, and a low edge of.0290, the study showed that the availability of ICT tools is influencing teachers' professional growth. This shows that the availability of ICT tools is within the appropriate interval at 95% CI. The present study complements the view of Swedish National School Improvement Agency (2021) which demonstrated that ICT tools ameliorated teachers job performance when integrated into teaching environments, teachers can integrate application trends because mechanized visual development in media like sports, entertainment, and movies is enough. The use of ICT can shift from an instructor focused approach to teacher-based approach, facilitating to ensure their full engagement in choosing their career (SNCIS, 2021).

Effect of Teacher's Competence and training in using ICT for TPD on Teachers Professional Development

Through the ability to create a WhatsApp group and use it for professional development, having the necessary computer skills for professional development, receiving regular training on ICT and how to use it for professional development, and knowing how to conduct internet research to find trustworthy information for professional learning, the researcher assessed the impact of teachers' competency and training in using ICT for TPD on teachers' professional development. Strongly disagree (SD), disagree (D), agree (A), and strongly agree (SA) are used to grade respondents' opinions. The corresponding values for these ratings were 1, 2, 3, and 4.

Table 7: Perception towards Competence and training in using ICT for TPD

Statements	Strongly Disagree %	Disagree %	Neutral %	Agree %	Strongly Agree %	Mean	Std
I know how I can create a WhatsApp group and use it for professional development	0.0	4.3	7.1	14.3	74.3	1.57	1.016
I have adequate skills to use a computer for professional development	0.0	4.3	12.9	28.6	54.3	1.77	1.165
In my school, we have regular trainings about ICT and how to use it for professional development	0.0	7.1	7.1	20.0	65.7	1.19	.398
I know how I can conduct internet research to find reliable information for professional learning	0.0	7.1	7.1	28.6	57.1	1.57	1.68

Source: Primary Data (2024)

Information revealed that perceptions of teachers about the contribution of the competency and training in using ICT. Accordingly, 74.3% of respondents strongly agreed, and 14.3% of respondents said that teachers know how they can create

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a WhatsApp group and use it for professional development. Accordingly, 57.1% of respondents strongly agreed, 28.6% of respondents agreed that teachers know how to conduct internet research to find reliable information for professional learning, and 54.3% of respondents strongly agreed that teachers have adequate skills to use a computer for professional development. Additionally, 65.7% of respondents strongly agreed, and 20.0% of respondents agreed that teachers receive regular training about ICT and how to use it for professional development. Teachers are able to have a more inclusive awareness of this research tangible work thanks to their ICT skills and training. The researcher invited head teachers to respond to a series of open-ended questions in order to investigate the impact of ICT proficiency and training on teachers' professional development. In this vein,

One head teacher remarked "*I know that basic computer skills are very important in teaching process, we have adopted effective strategies to improve ICT teaching methods. moreover, he confirms that they have facilitated teachers to use ICT software and hardware in order of improve teaching outcomes. Teachers use software and applications to improve the teaching process.*

Another head teacher evidences *"ICT tools use helped me and our staff members to manage discipline and teaching activities of our teachers, in our school, the use of starboard has improved the management. Furthermore, she observed that they have encouraged teachers to use electronic textbooks in order to manage discipline and teaching process.*

The present study finding concurs with the work of Leask (2022) who got to data quicker halls, as well as ICT instruments follow up as well as decipher data. They can get feedback, refine their agreement, assemble fresh information, and transition from a classroom environment to one outside of it thanks to innovations in technology (Learning Science Development Committee, 2020).

Table 8: Correlation Analysis

		Competence and training in using ICT for TPD	Teachers professional Development
Competence and training in using ICT for TPD	Pearson Correlation	1	.522**
	Sig.(2-tailed)	.000	.000
	N	172	172
Teachers professional development	Pearson Correlation	.522	1
	Sig.(2-tailed)	.000	.000
	N	172	172

Source: Primary Data (2024)

Results revealed association between competence and training in using ICT for TPD and teacher's professional development. The professional development of teachers was favorably correlated with their proficiency and training in using ICT for TPD. Pearson correlation score (p-value = 0.000, r = 0.522). The results indicate a strong and statistically significant relationship between teachers' professional growth and their proficiency and training in using ICT for TPD. Teachers' professional development greatly improved in terms of increased competency and training in using ICT for TPD. This research is in line with the use of hard to do in schools because of the important goals and number of subjects to cover, but now it may be performed by information tools that give large as well as shallower skills Leask, 2022).

Table 9: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	355.609	3	71.122	149.196	.000[a]
	Residual	269	169	.477		
	Total	437.601	172			

a. Predictors: (Constant), WhatsApp group creation, adequate skills to use a computer for professional development, regular trainings about ICT, conduct internet research to find reliable information for professional learning.

Source: Primary Data (2024)

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The creation of WhatsApp group, adequate skills to use a computer for professional development, regular trainings about ICT and how to use it for professional development, and conducting internet research to find reliable information for professional learning influence level of teacher's professional development. The result of the calculation was 71.122. This shows that the general model was relevant and that the establishment of a WhatsApp group, having the necessary computer skills for professional development, receiving regular training on ICT and how to use it for professional development, and searching the internet for trustworthy information for professional learning all have a strong correlation (90%) with the level of professional development of teachers.

The results from the present study did not contradict the work of Laurillard (2021) demonstrated that the grounds that ICT use is totally incorporated in the overall teaching framework, it is hard to disconnect the innovation factors and pick whether the noticed increases are an immediate aftereffect of the innovation usage or much different elements or mix of elements.

Table 10: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		b	Std. Error	Beta	t	Sig.
1	(Constant)	.824	.217		3.790	.000
	Utilization of ICT	.715	.175	.630	4.082	.000

a. Dependent Variable: Teachers professional development

Source: Primary Data (2024)

A unit of competency and training in using ICT stimulated the teachers' professional development to mean that 90% was limited by a factor of 0.175. The results showed that teachers' professional development improved to mean that 90% was 0.23 when they maintained independent (creation of a WhatsApp group, adequate skills to use a computer for professional development, regular trainings about ICT and how to use it for professional development, and conducting internet research to find reliable information for professional learning) to a constant zero. As a result, kids have a stronger connection to and are more driven to become proficient with ICTs.

It is inaccurate to assume that students understood and be able to use tools and software if they can recall their components. The present study is relevant since it has completed the knowledgeable gap found in the study Chiu and Churchill (2026) who demonstrated that this is disappointing for ICT because ICT's essential memory mechanism doesn't function the researcher acknowledges that teachers' low expectations, which downplay students' expectations and the entire educational system, are the most pervasive but subtle cause of the unprofessional in the use of ICTs.

Effect of Teacher's Attitudes on Teacher Professional Development

This study determines the effect of teachers' attitude toward ICT use on teacher's professional development. The researcher assessed learners' attitude through improving skills in ICT literacy, ICT allows to learn at pace and improve teaching, ICT helps to keep teachers up-to-date with the latest educational practices, interest in using ICT, and difficult to use ICT because of their age.

Table 11: Teachers' Perception towards their Attitude toward ICT Tools Utilization

Statements	Strongly Disagree %	Disagree %	Neutral %	Agree %	Strongly Disagree %	Mean	Std
I believe that using ICT can help me improve my skills in ICT literacy.	0.0	4.3	6.4	12.8	76.6	1.57	1.016
ICT allows me to learn at my pace and improve my teaching.	0.0	4.3	12.8	29.8	53.2	1.77	1.165
ICT helps to keep teachers up-to-date with the latest educational practices.	0.0	6.4	6.4	19.1	68.1	1.23	.428
I feel interested in using ICT for professional development	0.0	4.3	6.4	17.0	72.3	1.62	1.073
I believe that ICT is for teachers who teach in cities or urban areas	0.0	6.3	6.3	23.4	63.8	1.77	.983

Source: Primary Data (2024)

Data showed that 76.6% of respondents strongly agreed and 12.8% agreed that teachers believe that using ICT can help them improve their ICT literacy skills; 53.2% of students strongly agreed and 29.8% agreed that teachers believe ICT allows them to learn at their own pace and improve their teaching; 68.1% strongly agreed and 19.1% agreed that teachers believe ICT keeps them up to date with the most recent educational practices; 72.3% strongly agreed and63.8% of respondents strongly agreed and agreed 11 (23.4) that instructors feel that utilizing ICT is challenging due to their age, whereas 17.0% of respondents agreed that teachers are interested in using it for professional development. The results have been generally good because they did not conflict with Haggins's (2021) observation that teachers must have a positive attitude toward technology if they want to successfully implement innovation in their classrooms. ICT provides access to data to help educators try new strategies, think, consider practices, and use new materials (Learning Science Development Committee, 2021). To assess the effect of teachers, attitude toward ICT tools on teacher's professional development, the researcher held interview with head teachers. And the researcher remarks "In *this school, teachers are interested to have basic computer skills to improve their teaching process, teachers believe that using ICT for assessment process will enhance their work, in this school, students are willing to use ICT tools in the learning process and we encourage teachers to use word processing program in profiling name of students"*

Table 12: Correlation Analysis

		Teachers Attitude towards the use of ICT	Teachers professional Development
Teachers Attitude towards the use of ICT	Pearson Correlation		1
	Sign. (2-tailed)		
	N		172
	Sig.(2-tailed)		.000
	N		172
Teachers professional development	Pearson Correlation		.820
	Sig.(2-tailed)		.000
	N		172

Source: Primary Data (2024)

The results showed a 0.820 correlation between teachers' attitudes toward ICT use and their professional development, with a 0.000 p-value for two-tailed analysis. According to Churchill (2021), teachers who use ICT in the classroom must undoubtedly possess a basic degree of energy, be able to handle challenging assignments, and be safe. In addition, various assessments have shown that teachers' sole access to ICT equipment with a clear goal of preparation and preparation has perhaps the most serious impact on achieving ICT preparation and the inevitable use of learning space (Educational Standards Bureau, 2022).

Table 13: ANOVA

Model	Sum of Squares	df	Mean Square		sig
1 Regression	6.875	3	1.719	4425.648	.000[b]
Residual	.017	169	.000		
Total	6.892	172			

Dependent variable: Teachers professional development

Predictors: (Constant), Teacher Attitude towards The Use of ICT

Source: Primary Data (2024)

When used as a starting point for teacher attitude toward ICT use at 95% confidence, the ANOVA data showed that the f-statistic was 4425 with a p-value of 0.000, which was less than 5%. It implies that a teacher's professional development is impacted by their attitude toward using ICT. In the view of Rockman and Chessler (2023) who argued that teachers' computer knowledge affects both their job achievement and their access to engaging teaching opportunities. In addition, they rely on teachers to utilize ICT resources to teach and adapt the goals of our ICT mix in an acceptable way.

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Table 14: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% CI	
	Beta	St. Error	Beta			LB	UB
Constant	.138	.037		2.675	.010	.025	.175
Teachers Attitudes towards using ICT tools	413	.037	.376	11.242	.000	.339	.488

a. Dependent Variable: Teachers professional development

b. Predictors, Constant: Students and Teacher Attitude towards the Use of ICT

Source: Primary Data (2024)

Findings argued that the level of teacher professional development demonstrated that teacher attitude towards the use of ICT positively affect professional development where b= 0.413, t= 11.142, p-value =0.000. The CI was statistically affected professional development with 95%. The present study concurs with the works of Comber (2022) and Higgins (2022) which demonstrated that extended inspiration limits positive learning and leads, for example, to more consideration of examples where teachers are busy with learning exercises.

The aforementioned confirms that ICT supports an approach that is fundamentally advantageous to pupils and is centered on extra research into teaching. They discovered that two other significant effects of ICT in the classroom were increased appropriateness and teaching contributions. It also encourages new teachers to reflect on what they have thought and how they have learned it.

V. CONCLUSION

Based on the findings discussed in Chapter Four, the following conclusions are drawn in relation to each research objective and corresponding research question: The study concludes that the use of ICT tools has significantly improved teachers' professional development. Participants reported increased ICT literacy, development of innovative teaching strategies, and improved classroom practices. These findings suggest that integrating ICT into teaching has positively influenced how teachers plan, deliver, and assess learning.

Findings indicate that many schools are equipped with ICT laboratories, internet connectivity, computers, and regular ICT-related in-service training. However, despite the availability of these tools, the correlation between ICT tool accessibility and professional development was moderate. While the use of instructional software supported classroom teaching and teaching process management, there is a notable gap in access to industry-specific applications (e.g., fashion and building trade software) that could further enhance practical teaching skills.

The results show a strong positive relationship between teachers' attitudes toward ICT and their professional growth. Most teachers agreed or strongly agreed that they were more engaged and motivated when using ICT for tasks such as developing learner assessments. Therefore, a favorable attitude among teachers significantly contributes to the effective integration of ICT in their teaching practices.

The study concludes that while access to ICT tools is evident, institutional efforts—such as sustained in-service training and reflective practice—remain inadequate. Many teachers and school leaders have not fully embraced continuous professional development strategies that integrate ICT. This gap limits the long-term effectiveness of ICT in transforming teaching and learning processes.

REFERENCES

[1] Abdul, K., & Iftikhar, A. (2018). Importance of ICT in teacher professional development. *The University of Lahore, Pakistan Journal of ISOSS*, *113*, 113–127.

[2] Abu Sulemana, V. K. A., Anyanful, V. K., & Abdulai, I. B. (2018, June). The relationship between teachers' ICT knowledge and availability of ICT facilities in the junior high schools: A case study in the Savulugu District in the Northern Region of Ghana. *International Journal of Innovative Research and Development*, *7*(6).

[3] Abuya. (2019). Kenya government axes Class 1 laptop project for computer labs. *Techweez*. https://techweez.com/2019/02/25/jubilee-laptop-project-axed/

[4] Ajani, O. (2023, September). Exploring the alignment of professional development and classroom practices in African contexts: A discursive investigation. *Journal of Integrated Elementary Education*, *3*(2).

[5] Ajani, O. A., & Govender, S. (2023). Impact of ICT-driven teacher professional development for the enhancement of classroom practices in South Africa: A systematic review of literature. *Journal of Educational and Social Research*.

[6] Alam, D. M. (2023, March). Connectivism learning theory and connectivist approach in education. *Bhartiyam International Journal of Education & Research*, *12*(11).

[7] Albion, P. R., Tondeur, J., Forkosh-Baruch, A., & Peeraer, J. (2015). Teachers' professional development for ICT integration: Towards a reciprocal relationship between research and practice. *Education and Information Technologies*, *20*, 655–673.

[8] Beer, J. (2023). Looking at teacher professional development through a fourth-generation cultural-historical activity theory lens: The value of Change Laboratories. In *Future-Proofreading Teacher Education*.

[9] Bhattacharjee, B., & Deb, K. (2016). Role of ICT in 21st century's teacher education. *International Journal of Education and Information Studies*, *6*(1), 1–6.

[10] Bizimana, J. (2022). Effects of e-learning instructional strategies on students' academic performance in public secondary schools in Rwanda: A case study of Camp Kanombe Secondary School of Kicukiro District. *Stratford Peer Reviewed Journals and Book Publishing*.

[11] Brown, O. (2023). All about ICT in education? Definition, example and importance. *OBSBOT Blog*. https://www.obsbot.com/blog/e-classes/ict-in-education

[12] Cao. (2023). Marginalized education: Dilemmas and solutions for rural Chinese teachers. *Lecture Notes in Education Psychology and Public Media*, *27*(1), 147–154.

[13] Colmenero-Ruiz, M. J., & Bermudez, J. (2016). ICT and inclusive education: Attitudes of the teachers in secondary education. *Journal of Technology and Science Education*, *6*(1), 19–25.

[14] Dlamini, R., & Mbatha, K. (2018). The discourse on ICT teacher professional development needs: The case of South African teachers. *International Journal of Education and Development Using Information and Communication Technology*, *14*(2), 17–37.

[15] Dragan, C., Andrei, S., Popescu, R., & Ionescu, L. (2022). Attitudes of teachers to using Information and Communication Technology in teaching: Advantages and obstacles. *International Journal of Cognitive Research in Science, Engineering, and Education*, *10*(1), 69–76.

[16] Ellis, V., Correia, C., Turvey, K., Childs, A., Andon, N., Harrison, C., & Hayati, N. (2023). Redefinition/redirection and incremental change: A systematic review of innovation in teacher education research. *Teaching and Teacher Education*, *104*, 1–19.

[17] Gebremeskel, G. B. (2016). The paradigm role of ICT for behavioral and educational psychology: The case of developing countries. *International Journal of Information and Education Technology*, *6*(4), 301–307.

[18] Ghavifekr, S., Ibrahim, S. M., & Raub, S. F. (2019). Teaching and learning with ICT tools: Issues and challenges from teachers' perceptions. *Malaysian Online Journal of Educational Technology*, *7*(1), 36–58.

[19] Goh, E., & Sigala, M. (2020). Integrating Information & Communication Technology (ICT) into classroom instruction: Teaching tips for hospitality educators from a diffusion of innovation approach. *Journal of Teaching in Travel & Tourism*, *20*(2), 134–153.

[20] Govender, S., & Ajani, O. A. (2023). Impact of ICT-driven teacher professional development for the enhancement of classroom practices in South Africa: A systematic review of literature. *Journal of Educational and Social Research*, *13*(1), 56–68.

[21] Greunen, D. V. (2021, June). Enhancing ICT readiness of schools in South Africa. *DST Policy Brief*. Retrieved from https://www.dst.gov.za/images/Policy_Brief_June_2021.pdf

[22] Gusti, N. H. (2020). Teachers' ICT literacy and ICT integration in ELT. *Turkish Online Journal of Distance Education-TOJDE*, *21*(4), 195–211.

[23] Hamed, T. (2016). Sampling methods in research methodology: How to choose a sampling technique for research. *SSRN Electronic Journal*.

[24] Hargreaves, A., Parsley, D., & Cox, E. (2015). Designing rural school improvement networks: Aspirations and actualities. *Peabody Journal of Education*, *90*(5), 749–765.

[25] Hrastinski, S., & Ekaman, R. M. (2020). Communities, networks, and ICT professional development across schools in close physical proximity. *Technology, Pedagogy, and Education*, *29*(2), 219–229.

[26] Ifinedo, E., Rikala, L., & Hamalainen, T. (2020). Factors affecting Nigerian teacher educators' technology integration: Considering characteristics, knowledge constructs, ICT practices, and beliefs. *Computers & Education*, *145*, 103731.

[27] Jang, H., Kim, D., & Hwang, G. J. (2020). The effects of a mobile flipped classroom model on teachers' efficacy for online professional development. *Journal of Computer Assisted Learning*, *36*(4), 442–454.

[28] Jo, M. (2021). Assessing questionnaire reliability. *Select: Statistical Services*. Retrieved from http://select-statistics.co.uk/blog/assessing-questionnaire-reliability

[29] Joseph, L. M., & Sylvia, M. S. (2022). Exploring threats to novice teachers' development in selected secondary schools in South Africa. *International Journal of Learning, Teaching and Educational Research*, *21*(3), 1–15.

[30] Jude, W. I., & Dankaro, J. (2017). ICT resource utilization, availability, and accessibility by teacher educators for instructional development in the College of Education Katsina-Ala. *New Media and Mass Communication*, *55*, 23–28.

[31] Kavamahanga, J. M. (2019). *ICT policy in education*. Rwanda Basic Education Board (REB). Kigali, Rwanda.

[32] Koh, J. H. L., Chai, C. S., & Tsai, C. C. (2014). TPACK-in-action: Unpacking the contextual influences of teachers' construction of technological pedagogical content knowledge (TPACK). *Computers and Education*, *78*, 1–11.

[33] Majid, U. (2018). *Research fundamentals: Study design, population, and sample size*. ResearchGate. https://www.researchgate.net/publication/328919881

[34] McCombes, S. (2020). Descriptive research design. *Scribbr*. https://www.scribbr.com/methodology/descriptive-research

[35] MoEVT. (2015). *ICT competency standards*. Retrieved from https://teachertaskforce.org/sites/MoE-and-teachers-in-Tanzania_EN.pdf

[36] Molotsi, A. R. (2022, December). The use of ICT resources to transform teaching at secondary schools in the Bojanala. *South African Journal of Education*, *42*, 1–12.

[37] Munyengabe, S., Haiyan, H., & Zhao, Y. (2018). Information communication technology policy and public primary schools' efficiency in Rwanda. *South African Journal of Education*, *38*(2), 12–23.

[38] Muriuki, J. M. (2017). *Factors affecting the implementation of ICT use in primary public schools in Kajiado North Sub-County, Kenya* (Master's thesis, University of Nairobi). University of Nairobi Repository. https://www.uonrepository.ac.ke

[39] Mwendwa, K. N. (2017). Availability of resource materials and facilities for ICT integration in public primary school curriculum in Kitui County, Kenya. *Saudi Journal of Humanities and Social Sciences*, *2*(9), 362–368.

[40] Ndahayo, S, N., Mugiraneza, F, M., & Andala, H. O. (2023). Motivation factors and teacher retention in private secondary schools of Rwanda. *International Journal of Research and Innovation in Social Sciences*, *7*(2), 23–35.

[41] Oguoma, H. O., Nwachukwu, F. L., & Oparah, M. E. (2016). Utilization of ICT tools in teaching and learning in primary schools in Owerri Municipal Council of Imo State. *World Educators Forum*, *9*(3), 45–58.

[42] Samanta, G., & Ajani, O. A. (2023). Impact of ICT-driven teacher professional development for the enhancement of classroom practices in South Africa: A systematic review of literature. *Journal of Educational and Social Research*, *13*(2), 123–140.

[43] Sulba, W. (2020). *Public health research: Public health research guide*. Research guide at Benedictine University Library. Retrieved from https://www.benedictine.edu/research-guide

[44] Taherdoost, H. (2016). Sampling methods in research. *International Journal of Academic Research in Management (IJARM)*, *5*(4), 38–49.

[45] Teachers Service Commission (TSC). (2020). *TSC ICT policy*. Teachers Service Commission. Retrieved from https://www.tsc.go.ke/policies/ict-policy

[46] Undi, V. A., & Hashim, H. (2021). The demands of 21st-century learning: A study on primary school teachers' attitudes towards using ICT in English classrooms. *Creative Education*, *12*(8), 1666–1678.

[47] United Nations Educational, Scientific and Cultural Organization (UNESCO). (2023). *ICT in education: UNESCO's International Institute for Educational Planning*. UNESCO. Retrieved from https://www.iiep.unesco.org/ict-education

[48] Voogt, J., & McKenney, S. (2017). TPACK in teacher education: Are we preparing teachers to use technology for early literacy? *Technology, Pedagogy, and Education*, *26*(1), 69–83.

[49] Vuorikari, R. (2018). *Innovating professional development in compulsory education: Examples and cases of emerging practices for teacher professional development*. JRC Technical Report. Retrieved from https://publications.jrc.ec.europa.eu

[50] Wang, X. (2022). An overview of ICT and educational change: Development, impact, and factors. *Journal of Contemporary Educational Research*, *6*(4), 110–120.

[51] Washington, L. (2020). *Using technology to change education: Blended learning in the science classroom*. Lamar University. Retrieved from https://www.lamar.edu/blended-learning-science-education

[52] Wellspring. (2022). *Blended digital learning for teacher professional development*. Wellspring. Retrieved from https://www.wellspring.edu/blended-digital-learning

[53] Zeitlin, A., & Bower, J. (2018). Harnessing the potential of ICT for education in Rwanda. *International Growth Centre*. Retrieved from https://www.theigc.org/countries/rwanda/ict-education