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ICT-Based Instruction in the Teaching Practices of Grade 5 Teachers in Echague West District

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A B S T R A C T
This study examined the conditions and challenges in the implementation of ICT-based instruction among Grade 5 teachers in Echague West District using a descriptive-correlational design. It assessed ICT resources, teacher competence, institutional support, challenges, and coping strategies, and analyzed their relationships with ICT integration. Findings revealed that ICT resources are moderately available, while integration remains limited due to inadequate infrastructure, insufficient training, weak administrative support, and workload constraints. Despite these challenges, teachers demonstrated high levels of adaptability through self-learning, collaboration, and resource improvisation. Results also showed a significant relationship between ICT resources and integration. The study concludes that comprehensive interventions focusing on infrastructure, professional development, and policy support are necessary to achieve effective and sustainable ICT integration.

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INTRODUCTION

Information and Communication Technology (ICT) has become a transformative force in education worldwide, reshaping how teaching and learning are delivered. Studies show that ICT integration enhances learner engagement, supports differentiated instruction, and promotes student-centered learning (O. Adeosun et al., 2010; F. C. Ogenyi et al., 2023). However, despite its benefits, ICT integration remains uneven due to persistent challenges such as inadequate infrastructure, limited training, and unequal access to digital resources (J. Enu et al., 2018; Bernard Wiafe Akaadom et al., 2023). In the Philippines, similar issues persist despite national initiatives such as the DepEd Computerization Program and ICT4E Strategic Plan, especially in rural schools where resource limitations and training gaps are more pronounced (Tomaro et al., 2018; Rondubio et al., 2025). This makes ICT implementation in contexts like Echague West District highly relevant for investigation.

Despite global and national efforts to promote ICT integration, teachers continue to face significant barriers in effectively using technology for instruction. International studies highlight that teacher ICT competence is a critical determinant of successful integration, yet many educators lack adequate training and confidence in using digital tools (Aduwa-Ogiegbaen et al., 2009; Suárez-Rodríguez et al., 2012). In developing contexts, challenges such as poor internet connectivity, lack of technical support, and reliance on traditional teaching methods further limit ICT use (Salehi et al., 2012; Kaur et al., 2023; Escalante et al., 2025). In the Philippines, these issues are compounded by limited professional development opportunities and infrastructural constraints, particularly in rural areas where schools struggle to sustain technology-based instruction (Calatayud et al., 2025; Cabunoc et al., 2024). As a result, ICT-based education remains inconsistently implemented, affecting teaching quality and learner equity.

Addressing these challenges requires a holistic approach that combines infrastructure improvement, continuous professional development, and strong institutional support. Literature emphasizes that effective ICT integration depends not only on access to technology but also on teachers' pedagogical and technical competence (Jesús M. Suárez-Rodríguez et al., 2012; Mishra et al., 2023). Sustained training through seminars, mentoring, and collaborative learning communities has been shown to improve teacher confidence and instructional innovation (Aduwa-Ogiegbaen et al., 2009). Moreover, addressing systemic barriers such as connectivity issues and resource shortages is essential to ensuring equitable ICT implementation across schools (Unal et al., 2012; Kaur et al., 2023). These combined efforts can help bridge the gap between ICT policy and actual classroom practice.

This study therefore proposes to examine the conditions and challenges in the implementation of ICT-based instruction among Grade 5 teachers in Echague West District. It will explore teachers' ICT competence, instructional practices, and the barriers they encounter in integrating technology into teaching and learning. Anchored on existing literature (Tomaro et al., 2018; Rondubio et al., 2025; Cabunoc et al., 2024), the study aims to identify how these challenges affect

teaching effectiveness and learner engagement. Ultimately, it seeks to develop an intervention program that enhances ICT integration in classrooms, ensuring that digital learning is effectively implemented even in resource-constrained and rural school settings, thereby contributing to a more inclusive and technology-driven education system.

LITERATURE REVIEW

The literature review is organized into two central themes: enabling conditions for ICT integration and barriers with adaptive responses in ICT-based instruction. Studies consistently show that effective ICT integration relies on the alignment of infrastructure, teacher competence, and institutional support. Globally, ICT has transformed education into a more interactive and learner-centered process that promotes 21st-century skills (Wai-Kong Ng et al., 2010; Ronghuai Huang et al., 2014; Kozma et al., 2005; Kumar et al., 2023; Sulisworo et al., 2025). In the Philippines, initiatives on infrastructure and training support this transformation (Espinosa et al., 2011; Tomaro et al., 2018; Dios et al., 2016). However, successful implementation depends on adequate resources (Anil et al., 2020; Mathevula et al., 2014; Mwendwa et al., 2017; Nadhif et al., 2024), continuous professional development (Bingimlas et al., 2009; Li et al., 2019; Sultana et al., 2023; Dlamini et al., 2018; Sahito et al., 2025), and strong administrative support (Rojas Briñez et al., 2023; Baharuldin et al., 2020; Murphy et al., 1997; Ross et al., 2002), all of which significantly influence teaching effectiveness and learning outcomes (Voogt et al., 2015; Horany et al., 2022; Bariu et al., 2022; Ntorukiri et al., 2022).

Despite these enabling factors, ICT integration remains constrained by technological, pedagogical, institutional, and socioeconomic barriers. These include limited infrastructure, inadequate training, weak policy implementation, and time constraints (Bingimlas et al., 2009; Naaz et al., 2025; Rondubio et al., 2025; Escalante et al., 2025; Salehi et al., n.d.; Adhikari et al., 2024; Salam et al., 2017; Buabeng-Andoh et al., 2012; Unal et al., 2012; Cabunoc et al., 2024; Saxena et al., 2017; Tondeur et al., 2008; Ojala et al., 2025; Losada et al., 2011; Sailin et al., 2014; Raman et al., 2014; Sahito et al., 2021; Kitonga et al., 2024; Pettalongi et al., 2024; Puja et al., 2024; Tahmasebi et al., 2023). In the Philippine context, disparities in access and training persist (Tomaro et al., 2018; Calatayud et al., 2025), yet teachers demonstrate resilience through self-directed learning, collaboration, and resource improvisation (Intatano et al., 2019; Alpuerto et al., 2022; Suryani et al., 2021; Nacisvalencia et al., 2023; Sarueda et al., 2025; Ahmed et al., 2024). While ICT improves engagement, its impact on academic performance varies (Horany et al., 2022; Asare et al., 2023; Prajapati et al., 2025; Raza et al., 2024). Overall, the literature highlights that ICT integration is a complex and context-dependent process that requires a holistic approach combining resources, teacher empowerment, and strong institutional support to achieve sustainable and equitable education.

METHODOLOGY

This study employs a descriptive-correlational research design to examine the integration of Information and Communication Technology (ICT) among

Grade 5 teachers in the Echague West District, Isabela. The descriptive component focuses on identifying current conditions, practices, and challenges related to ICT use, including teacher competence, resource availability, and institutional support, while the correlational aspect determines relationships between variables such as ICT competence and instructional effectiveness. The study is conducted in a public elementary school district with diverse technological capacities, providing a realistic rural context for ICT implementation. Respondents are purposively selected Grade 5 teachers with at least one year of experience and exposure to ICT-based instruction, ensuring relevant and experience-based data.

Data are collected through a validated structured questionnaire composed of Likert-scale and open-ended items covering demographics, ICT resources, competency, usage, challenges, and coping strategies. Prior to data collection, permissions and informed consent are secured to uphold ethical standards. The researcher administers and retrieves the questionnaires to ensure accuracy and completeness. Data are analyzed using descriptive statistics such as frequency, percentage, mean, and standard deviation, and inferential tools including Pearson's correlation and ANOVA to examine relationships and differences among variables. Statistical software such as SPSS or Excel is used to ensure reliability, enabling the study to generate data-driven conclusions and recommendations for improving ICT-based instruction.

RESEARCH RESULTS AND DISCUSSION

Profile of Respondents

Table 1. Distribution of Respondents According to Years of Teaching Experience (n = 100)

Years of Teaching Experience	Frequency	Percentage (%)
1–5 years	20	20%
6–10 years	30	30%
11–15 years	25	25%
16 years and above	25	25%
Total	**100**	**100%**

The table shows that most respondents have 6–10 years of teaching experience (30%), followed by those with 11–15 years and 16 years and above (both 25%), while 20% have 1–5 years. This indicates that the majority of teachers are moderately to highly experienced, suggesting that they already possess foundational pedagogical skills and classroom management competencies that could support ICT integration in instruction.

However, related literature presents mixed findings on the relationship between teaching experience and ICT use. N (2017, 2022) reported that experience can positively influence ICT integration, as more seasoned teachers may develop stronger instructional adaptability. In contrast, Chaiban and Oweini (2024) found a negative relationship, suggesting that highly experienced teachers may be less inclined to adopt ICT due to reliance on traditional methods.

Other studies argue that teaching experience is not a significant determinant at all. Mahdi and Al-Dera (2013), Alazam et al. (2012), and Chemwei

et al. (2016) found no meaningful differences in ICT integration across experience levels. Overall, these findings imply that while the respondents have substantial teaching experience, ICT integration is more strongly influenced by factors such as training, resources, attitudes, and institutional support rather than years of service alone.

Table 2. Distribution of Respondents According to ICT Training Exposure (n = 100)

ICT Training Exposure	Frequency	Percentage (%)
None	15	15%
1–2 Trainings	35	35%
3–5 Trainings	30	30%
More than 5 Trainings	20	20%
Total	**100**	**100%**

Most respondents have attended 1–2 ICT trainings (35%), followed by 3–5 trainings (30%), while 20% have attended more than five. However, 15% reported no ICT training. This indicates that although many teachers have been exposed to ICT-related professional development, the extent of training is uneven, and a notable proportion still lacks formal preparation.

Related literature confirms this inconsistency. Diyal and Malla (2025) highlight disparities in ICT training quality and continuity, while Gautam (2023) notes that many teachers remain inadequately trained despite exposure to ICT programs. These suggest that limited or irregular training may not be sufficient to build strong ICT competence.

Abbasi et al. (2025) identify insufficient training as a key barrier to ICT integration, while Mahmud and Ismail (2010) emphasize that structured ICT training improves digital literacy. Overall, the findings suggest that while ICT training is present among most teachers, there is a need for more consistent, sustained, and practice-based professional development to ensure effective ICT integration in teaching.

Table 3. Availability of ICT Resources in Schools (n = 100)

Indicator	Mean	Description
Computers	3.20	Moderately Available
Internet Connection	2.80	Less Available
Projectors	3.10	Moderately Available
Software/Applications	3.00	Moderately Available
Overall Mean	3.03	Moderately Available

The results show that ICT resources are generally moderately available, with an overall mean of 3.03. Basic tools such as computers and projectors are relatively accessible, supporting basic ICT integration in teaching. However, internet connectivity received a lower rating, indicating limitations in conducting online and technology-enhanced learning. This suggests that while schools have essential ICT equipment, inconsistent access—especially to reliable internet—remains a key constraint in fully implementing ICT-based instruction.

This finding aligns with related literature highlighting uneven ICT resource distribution. Ndazhaga et al. (2025) reported that private schools tend

to have better ICT facilities than public schools, while Cuenta (2025) found that although basic devices are available in many Philippine schools, advanced tools and stable internet infrastructure remain limited. These studies reflect persistent gaps in ICT resource availability across educational settings.

Further studies emphasize connectivity as a major barrier. Mwendwa (2017) and Mathevula and Uwizeyimana (2014) both noted shortages in both equipment and reliable internet access, while Magtoltol and Oropa (2025) identified unstable internet as a significant challenge in ICT integration. Overall, the findings suggest that despite moderate availability of ICT resources, limitations in connectivity and infrastructure continue to hinder effective and sustained use of technology in teaching.

Table 4. Adequacy of ICT Resources in Schools (n = 100)

Indicator	**Mean**	**Description**
Quantity of Devices	2.90	Moderately Adequate
Quality of Equipment	2.85	Moderately Adequate
Internet Speed	2.60	Less Adequate
Maintenance Support	2.70	Less Adequate
Overall Mean	2.76	Moderately Adequate

The findings show that ICT resources are moderately adequate, with an overall mean of 2.76. While schools have enough basic devices to support instruction, their adequacy is limited when distributed across users and instructional demands. Internet speed and maintenance support received lower ratings, indicating ongoing technical and operational issues. This suggests that although ICT tools are available, their reliability and functionality are not fully sufficient for sustained ICT-based instruction.

Related literature supports this gap between availability and adequacy. Akah et al. (2022) found that ICT resources may be available but still insufficient to meet instructional needs, while Ponniah et al. (2023) reported similar shortcomings in school ICT facilities that fall below required standards. Magtoltol and Oropa (2025) further emphasized unstable internet connectivity as a serious barrier affecting ICT use in schools.

In addition, Escalante et al. (2025) identified slow internet and limited resources as key constraints, while Mathevula and Uwizeyimana (2014) highlighted inadequate maintenance and equipment shortages as factors that hinder effective teaching. Overall, the findings suggest that improving ICT adequacy requires not only increasing resources but also strengthening infrastructure, connectivity, and technical support systems.

Table 5. Level of Teachers' ICT Competency (n = 100)

Indicator	**Mean**	**Description**
Basic Computer Skills	3.50	High
Use of Educational Software	3.20	Moderate
Online Teaching Skills	3.00	Moderate
Troubleshooting Skills	2.80	Moderate
Overall Mean	3.13	Moderate

The table indicates that teachers have a moderate level of ICT competency, with an overall mean of 3.13. Basic skills such as word processing, presentations, and basic navigation are relatively strong, showing that teachers are generally comfortable with fundamental ICT use. However, advanced skills such as troubleshooting and conducting technology-enhanced instruction remain only moderately developed, suggesting a gap in higher-level ICT application.

This finding is consistent with existing literature. Umar and Yusoff (2014) reported similar results, where teachers showed higher competence in basic ICT skills (mean = 3.13) than in advanced skills (mean = 2.31). Alazam et al. (2012) and Mahmud and Ismail (2010) also found that teachers generally possess moderate ICT competence, particularly in routine tasks rather than complex applications.

Further studies highlight the need for improvement in advanced ICT skills. Estolas (2025) identified gaps in areas such as troubleshooting and data management, while Akarawang et al. (2015) and Simkhada and Gelal (2023) emphasized the importance of targeted, practical ICT training. Overall, the findings suggest that while teachers have sufficient foundational ICT skills, continuous and focused professional development is necessary to strengthen advanced competencies for more effective technology integration.

Table 6. Extent of Teachers' Participation in ICT Professional Development (n = 100)

Indicator	**Mean**	**Description**
Workshops	3.20	Moderate
Seminars	3.30	Moderate
Online Courses	2.90	Moderate
Peer Learning	3.10	Moderate
Overall Mean	3.13	Moderate

The findings indicate that teachers' participation in ICT-related professional development is at a moderate level. This suggests that while educators are involved in training activities, their engagement is not yet intensive or sustained enough to produce transformative changes in instructional practice. Participation is more common in seminars and workshops, while online courses are less frequently attended. Peer learning also serves as an informal support system, but overall engagement reflects limitations in access, continuity, and depth of ICT training opportunities.

Related literature provides partial support for this result. Panaou and Vrasidas (2010) identified barriers such as limited time, inadequate infrastructure, and weak institutional support, which may explain moderate levels of participation in ICT training. Owen et al. (2018) further emphasized that professional development is often weakened by poor coordination and lack of follow-up, making peer learning an important but supplementary mechanism for skill development.

However, evidence regarding preference for training formats is less conclusive. While the findings suggest greater participation in seminars and workshops than online courses, Ngeze and Iyer (2019) showed that well-designed online training can be effective when properly supported. Overall, the

results imply that improving ICT professional development requires not just more training opportunities, but also better design, accessibility, institutional support, and sustained implementation mechanisms.

Table 7. Level of Administrative Support for ICT Integration (n = 100)

Indicator	Mean	Description
Provision of Resources	3.10	Moderate
Policy Support	3.00	Moderate
Monitoring and Supervision	3.20	Moderate
Encouragement to Use ICT	3.30	Moderate
Overall Mean	3.15	Moderate

The findings show that administrative support for ICT integration is moderate, with an overall mean of 3.15. School leaders provide encouragement and some supervision in the use of ICT, but support in terms of clear policies, sustained monitoring, and provision of resources appears limited. This suggests that while leadership support exists, it is not yet strong or consistent enough to fully drive effective ICT integration in teaching and learning.

Related literature supports this observation. Isaac-Oloniyo (2025) reported a "mixed degree of support" for ICT initiatives, noting gaps in funding, incentives, and professional development. Likewise, Lomo et al. (2024) found that although school heads promote ICT use, their efforts are constrained by limited financial resources and inadequate infrastructure such as electricity and internet access.

Further studies highlight the importance of structured policies and coordinated implementation. Atyang et al. (2018) observed that moderate administrative support does not necessarily translate into strong ICT usage in classrooms, while Tondeur et al. (2008) and Kato et al. (2026) emphasized that weak or uncoordinated ICT policies limit the effectiveness of school-based technology initiatives. Overall, the findings suggest that stronger policy direction, resource allocation, and sustained institutional support are needed to enhance ICT integration.

Table 8. Level of Technical Support for ICT Use (n = 100)

Indicator	Mean	Description
Availability of ICT Staff	2.80	Moderate
Troubleshooting Support	2.70	Moderate
Maintenance Services	2.60	Moderate
System Upgrades	2.75	Moderate
Overall Mean	2.71	Moderate

The results indicate that technical support in schools is moderately available, with an overall mean of 2.71. While teachers can access assistance when technical issues arise, support is not always immediate or consistent. Maintenance and system upgrades are also not given strong priority, which may affect the reliability and long-term usability of ICT resources. This suggests that basic technical support systems exist, but they are not yet sufficient to fully support effective ICT integration in classrooms.

Related literature supports this finding. Ronnkvist et al. (2000) reported that only a small number of teachers consistently had access to technical assistance, while others had little to no support. Madronio (2023) likewise found low satisfaction among educators regarding ICT maintenance, while Adelabu and Fumba (2025) emphasized that poor maintenance practices hinder effective use of ICT resources.

In addition, Martinez and Umekubo (2005) noted that many schools have limited technical staff, resulting in delayed responses to technical issues and weak system maintenance. Overall, these studies suggest that improving ICT integration requires not only providing technical support but also ensuring its consistency, responsiveness, and adequate staffing.

Table 9. Level of Peer Support in ICT Integration (n = 100)

Indicator	Mean	Description
Sharing of Resources	3.40	Moderate
Collaboration	3.30	Moderate
Mentoring	3.20	Moderate
Team Teaching	3.10	Moderate
Overall Mean	3.25	Moderate

The findings show that peer support among teachers is moderately high, with an overall mean of 3.25. This indicates that collaboration, resource sharing, and informal assistance are commonly practiced in schools. Teachers frequently rely on colleagues when integrating ICT into instruction, while mentoring and team teaching are also present to some extent. Overall, peer relationships function as an important support system that helps teachers address challenges in ICT use.

This is supported by literature emphasizing the role of collegial collaboration in ICT integration. Chisalita and Cretu (2015) found that peer collaboration strengthens teachers' ICT use, while Hatlevik and Hatlevik (2018) reported a positive relationship between collegial support and technology adoption in teaching practices. These studies highlight that collaborative environments encourage greater engagement with ICT tools.

Further research reinforces this finding. Gan Poh Choo and Chua (2007) emphasized that peer coaching provides continuous encouragement during technology integration, while Granger et al. (2002) identified collaborative teacher relationships as essential to effective ICT implementation. Overall, the findings suggest that peer support plays a key role in sustaining ICT use and complementing formal training efforts in schools.

Table 10. Extent of ICT Integration in Teaching Practices (n = 100)

Indicator	Mean	Description
Use in Lesson Delivery	3.20	Moderate
Use in Assessment	3.00	Moderate
Use in Classroom Activities	3.10	Moderate
Use in Communication	3.30	Moderate
Overall Mean	3.15	Moderate

The results indicate that ICT integration in teaching practices is at a moderate level (overall mean = 3.15). Teachers commonly use ICT for lesson delivery and communication, showing that technology has become part of routine instruction. However, its use in assessment and interactive, learner-centered activities remains limited, suggesting that ICT is still largely used for basic functions rather than innovative pedagogy.

This finding is consistent with related literature showing similar patterns of moderate or uneven ICT integration. Ku Hafisal Ku Mahamud and Abdull Sukor Shaari (2020) reported moderate ICT use among teachers, while A. Alazam et al. (2012) likewise found moderate levels of ICT skills and classroom application. However, Ibrahim Umar and Amat Sazali Abu Hassan (2015) observed low ICT integration in some contexts, indicating that implementation varies depending on access, training, and support systems.

Other studies further emphasize that ICT use often remains at a basic or presentational level. Ira Raveh et al. (2025) found moderate use for presenting content and assessment but limited use for inquiry-based learning, while Aydın Aslan and Chang Zhu (2016) noted that ICT integration often stays at a demonstrative stage. Similarly, A. Z. A. Razak (2014) observed that ICT is sometimes used more outside classroom instruction than within it.

Taken together, these findings suggest that although ICT is already embedded in teaching routines, its potential to transform learning experiences is not yet fully realized. The moderate level of integration reflects a transitional stage where teachers are still moving from basic utilization toward more advanced, interactive, and pedagogically rich applications of ICT in instruction.

Table 11. Challenges in Technological Availability and Equipment (n = 100)

Indicator	**Mean**	**Description**
Lack of Devices	3.50	High
Poor Internet	3.60	High
Outdated Equipment	3.40	High
Limited Access	3.45	High
Overall Mean	3.49	High

The table indicates that challenges related to technological availability are high, with an overall mean of 3.49. Among these, poor internet connectivity emerges as the most significant issue experienced by teachers, followed by limited access to devices and the presence of outdated equipment. These conditions highlight persistent infrastructural limitations within schools, suggesting that the availability and quality of technological resources remain major obstacles to the effective use of ICT in teaching and learning.

This finding is strongly supported by existing literature, which consistently identifies infrastructure as a critical barrier to ICT integration. For instance, Rocelino Magtoltol and Jane Oropa (2025) reported that unstable internet connection received the highest barrier rating among teachers, alongside issues related to limited access to hardware and software resources. Similarly, G. P. Adhikari (2024) emphasized that inadequate technological resources and unreliable connectivity significantly hinder ICT implementation in schools.

These findings reinforce the idea that even when teachers are willing to adopt ICT, infrastructural constraints can limit their ability to do so effectively.

Moreover, similar challenges have been documented across different educational contexts. Phumlani Gumede and Andiso Ngobe (2025) highlighted issues such as insufficient hardware, poor maintenance, and unreliable electricity supply, while Hadi Salehi and Zahra Salehi (2012) pointed to limited internet access and lack of technical support as key barriers. Taken together, these studies demonstrate that technological availability is a widespread concern, and without adequate infrastructure, efforts to integrate ICT into education are likely to remain constrained.

Table 12. Challenges in Digital Literacy and Readiness (n = 100)

Indicator	Mean	Description
Lack of Skills	3.20	Moderate
Low Confidence	3.10	Moderate
Limited Training	3.30	Moderate
Difficulty in Use	3.15	Moderate
Overall Mean	3.19	Moderate

The results show that challenges in digital literacy among teachers are moderate. Educators demonstrate basic ICT skills; however, they still encounter difficulties due to limited training and lack of confidence, particularly when dealing with more advanced applications. This situation indicates that while foundational competencies are present, there remains a gap in higher-level digital skills necessary for more effective and innovative teaching practices, thereby highlighting the need for continuous and structured ICT training programs.

This condition is consistently supported by existing studies. For instance, R. Mahmud and M. A. Ismail (2010) found that teachers possess moderate levels of basic ICT knowledge and skills, while C. Tian (2014) reported similar levels of digital literacy among educators. More recent findings by Sajid Ahmad (2025) further confirm that teachers are generally capable of performing basic digital tasks such as using office applications, internet searches, and email communication, yet they experience significant difficulty with advanced tools like learning management systems and digital instructional platforms.

Moreover, the need for sustained professional development is emphasized across multiple studies. Rocelino Magtoltol and Jane Oropa (2025) identified inadequate training as a serious barrier to ICT integration, while Alvic Arnado and G. Aviles (2023) reported that teachers only have moderate confidence in using technology. These findings collectively suggest that although teachers have a foundational level of digital competence, continuous, hands-on training is essential to develop advanced skills and improve overall confidence in ICT use within educational settings.

Table 13. Challenges in Instructional Time and Workload (n = 100)

Indicator	Mean	Description
Limited Time	3.40	High
Heavy Workload	3.50	High
Lesson Preparation Time	3.30	Moderate

ICT Setup Time	3.35	Moderate
Overall Mean	3.39	High

The table reveals that time and workload challenges are high among teachers, indicating that balancing ICT integration with multiple professional responsibilities remains a significant concern. Heavy teaching loads, administrative tasks, and other school-related duties limit the time available for planning and implementing technology-based instruction. In addition, restricted instructional time further reduces opportunities to meaningfully incorporate ICT into classroom activities, thereby constraining its effective use in teaching and learning.

This finding is supported by several studies that consistently identify time as a major barrier to ICT integration. For instance, S. Sailin (2014) described time constraints as a primary barrier influencing teachers' ability to adopt technology in their instruction. Similarly, Hadi Salehi and Zahra Salehi (2012) found that limited class time discourages teachers from using ICT tools effectively. In the same vein, D. V. Vicente Rondubio and J. Gantalao (2025) reported that teachers experience a lack of time due to numerous ancillary duties, while A. Ngao et al. (2022) highlighted that heavy teaching workloads and time limitations significantly hinder ICT integration efforts.

Although much of the evidence is descriptive in nature, there is clear agreement across studies that time-related constraints negatively affect teachers' capacity to integrate ICT. These findings suggest that without adequate time allocation, reduced workload, or institutional support mechanisms, efforts to enhance ICT use in education may remain limited, regardless of teachers' willingness or access to technological resources.

Table 14. Challenges in Institutional Policies and Curriculum (n = 100)

Indicator	**Mean**	**Description**
Strict Curriculum	3.20	Moderate
Policy Limitations	3.10	Moderate
Lack of Guidelines	3.30	Moderate
Limited Support	3.25	Moderate
Overall Mean	3.21	Moderate

The findings indicate that institutional challenges related to ICT integration are moderate. Policies and curriculum requirements appear to limit flexibility in the use of technology, making it difficult for teachers to fully adapt ICT to their instructional needs. In addition, the lack of clear and consistent guidelines contributes to uncertainty in implementation. These conditions suggest that while institutional structures are present, they may not be sufficiently aligned to support effective and flexible ICT integration in classroom practices.

This situation is supported by several studies that highlight gaps in institutional support. For instance, Athanasia Regli et al. (2026) found moderate levels of ICT implementation, with deficiencies in leadership and technical support identified as key barriers. Similarly, Emmanuel Ayisi Abedi (2023) reported inconsistencies between ICT policies and actual classroom practices,

indicating that existing frameworks may not be effectively translated into practice. These findings point to the need for more coherent and actionable institutional policies that can better guide teachers in integrating ICT.

Moreover, the importance of clear guidance and strengthened institutional support is emphasized in the literature. Farhana Naaz (2025) identified insufficient professional development and inconsistent support systems as major challenges faced by teachers. In the same way, Joke Tondeur et al. (2008) demonstrated that school policies, training opportunities, and organizational support significantly influence the extent of ICT use in teaching. Taken together, these studies suggest that enhancing institutional frameworks, clarifying guidelines, and providing sustained support can play a crucial role in improving ICT practices in education.

Table 15. Effects on Teachers' Motivation (n = 100)

Indicator	**Mean**	**Description**
Decreased Motivation	3.20	Moderate
Stress Level	3.40	High
Confidence Level	3.10	Moderate
Willingness to Use ICT	3.00	Moderate
Overall Mean	3.18	Moderate

The findings indicate that challenges moderately affect teachers' motivation, with increased stress emerging as a major concern. While teachers remain generally willing to integrate ICT, their confidence and motivation are somewhat influenced by the pressures associated with implementation. These conditions suggest that although teachers continue to engage in their professional responsibilities, the presence of challenges—particularly stress—can gradually weaken their enthusiasm and capacity to sustain effective ICT practices, thereby highlighting the need for strong support systems.

This pattern is supported by several studies that emphasize the impact of stress on teacher motivation. For instance, Einar M. Skaalvik and Sidsel Skaalvik (2018) identified time pressure as a major predictor of teacher well-being, while their earlier study (2016) showed that stress and self-efficacy significantly influence motivation and emotional exhaustion. Similarly, Jinda Kongcharoen et al. (2019) found that stress is closely associated with teachers' work motivation, reinforcing the idea that increasing demands can negatively affect both confidence and willingness to perform effectively.

At the same time, the importance of support systems in sustaining motivation is strongly emphasized in the literature. Mohammad Amayreh and Mohd Anuar Arshad (2025) highlighted the role of organizational support in improving job satisfaction, while Susan Beltman and Emily Poulton (2025) identified both personal and contextual strategies as essential in maintaining teacher motivation. However, C. López and Leila L. Ravana (2025) noted that not all teachers perceive challenges as severe, suggesting that the effects on motivation may vary depending on context. Overall, these studies affirm that while challenges may not always be overwhelming, their cumulative impact—especially through

stress—necessitates consistent institutional and emotional support to sustain teacher motivation.

Table 16. Effects on Instructional Strategies (n = 100)

Indicator	Mean	Description
Use of Innovative Methods	3.10	Moderate
Lesson Creativity	3.20	Moderate
Student-Centered Approach	3.00	Moderate
Adaptability	3.15	Moderate
Overall Mean	3.11	Moderate

The results show that challenges moderately influence teachers' instructional strategies. While teachers continue to attempt innovative and student-centered approaches, various limitations restrict their creativity and adaptability in fully implementing ICT-based instruction. As a result, ICT is not maximized in instructional planning and delivery, leading to a situation where technology is used, but not to its full pedagogical potential. This suggests that although teachers are willing to innovate, structural and professional constraints limit the extent to which these innovations can be effectively realized in classroom practice.

This finding is strongly supported by several studies emphasizing both the persistence of innovation and the presence of constraints. For instance, Thapelo Mokgadi and T. Moloi (2025), along with Joshua Nii Akai Nettey et al. (2024), and M. Msafiri et al. (2023), consistently reported that insufficient infrastructure, limited training, and inadequate technical support significantly restrict ICT integration. Despite these challenges, teachers demonstrate a strong willingness to innovate, with Joshua Nii Akai Nettey et al. (2024) noting their clear intent to incorporate ICT into teaching and learning activities.

Furthermore, other studies highlight that teachers recognize the pedagogical value of ICT but are constrained in practice. L. Ribeiro et al. (2026) found that while educators acknowledge ICT's potential to diversify instructional strategies, limited infrastructure and lack of continuous professional development hinder effective implementation. Similarly, Chhayna Cheng and Pheara Khy (2025) emphasized that although ICT adoption promotes innovative teaching approaches, persistent challenges such as low digital literacy and inadequate resources continue to restrict its full utilization. Overall, the literature suggests that while innovation is present, its impact is moderated by ongoing systemic and capacity-related constraints.

Table 17. Effects on Student Engagement (n = 100)

Indicator	Mean	Description
Participation	3.10	Moderate
Interest	3.20	Moderate
Interaction	3.00	Moderate
Attention	3.15	Moderate
Overall Mean	3.11	Moderate

The findings indicate that student engagement is moderately affected by ICT-related challenges. While students continue to show interest and participate in learning activities, their engagement is not at an optimal level. Limited and

inconsistent use of ICT reduces opportunities for interactive and collaborative learning experiences, which are essential for sustaining higher levels of student involvement. This suggests that although ICT is present in the learning environment, its potential to fully enhance engagement has not yet been fully realized.

This observation is partially supported by existing literature, although many studies highlight a stronger positive impact of ICT on student engagement when it is effectively implemented. For instance, Jenette R. Cabalbag (2025) found that technology significantly enhances student engagement in higher education settings, while John Mhel S. Hagutin et al. (2025) reported high levels of cognitive and behavioral engagement among students when ICT is regularly used in instruction. Similarly, Purnawati Purnawati et al. (2024) documented measurable improvements in cognitive engagement in ICT-integrated classrooms, suggesting that technology can substantially enrich learning experiences when properly applied.

However, other studies also emphasize that the effectiveness of ICT in enhancing engagement is dependent on adequate support systems. Aradhana and Shilpi Bhattacharya (2024), along with Marizka Rimadhona et al. (2025), identified infrastructure limitations and insufficient teacher training as major constraints affecting ICT implementation. Additionally, John Mhel S. Hagutin et al. (2025) noted that ICT alone does not guarantee improved learning outcomes unless it is integrated with purposeful instructional strategies. Overall, the literature suggests that while ICT has strong potential to enhance student engagement, its impact is moderated by the quality of implementation and the availability of institutional and technical support.

Table 18. Coping Strategies of Teachers (n = 100)

Indicator	**Mean**	**Description**
Self-learning	3.50	High
Peer Collaboration	3.40	High
Use of Personal Devices	3.30	Moderate
Improvisation	3.35	Moderate
Overall Mean	3.39	High

The findings indicate that teachers demonstrate high coping strategies in dealing with ICT-related challenges. Despite constraints in resources and institutional support, they continue to rely on self-learning, collaboration with colleagues, and improvisation to sustain their instructional practices. These coping mechanisms reflect teachers' resilience, as they actively seek ways to overcome limitations and maintain the continuity of ICT integration in teaching and learning.

This pattern is supported by several studies that highlight strong coping behaviors among teachers in different contexts. For instance, Faith Amoroso (2025) found that teachers exhibit high levels of coping strategies, including self-care and problem-solving approaches. Similarly, Russel Rodel E. Emborgo and Jenyliza Ucang (2025) identified multiple coping mechanisms used by teachers to manage instructional challenges, while Leo L. Codilla Jr. et al. (2023)

documented effective coping strategies employed by educators despite facing significant barriers in ICT implementation.

Moreover, collaboration and resourcefulness are consistently emphasized in the literature. Isabelle Krummenacher et al. (2024) highlighted social support from colleagues as a key resource in managing teaching demands, while Minseok Yang et al. (2023) discussed the role of collaborative professionalism in strengthening teacher resilience. In addition, Reyin Joy Wabingga and Juvy Love Tomakin (2025) found that teachers often use improvisation and innovative approaches to address instructional limitations. Overall, these studies suggest that while challenges persist, teachers actively develop adaptive strategies that enable them to sustain ICT integration in their professional practice.

Table 19. Relationship Between ICT Resources and ICT Integration (n = 100)

Variables Compared	Computed r-value	p-value	Decision	Interpretation
ICT Resources vs ICT Integration	0.65	0.001	Significant	Reject H_0

The table indicates a significant relationship between ICT resources and ICT integration, as shown by an r-value of 0.65 and a p-value of 0.001. This reflects a strong positive correlation, suggesting that as the availability of ICT resources increases, teachers are more likely to integrate technology into their instructional practices. The result implies that adequate access to hardware, software, and related facilities plays an essential role in supporting effective ICT use in the classroom, leading to the rejection of the null hypothesis.

This finding is consistent with several empirical studies that highlight the importance of ICT resources in shaping integration practices. For instance, Kusow M. Nadhif et al. (2024) reported a similarly strong positive correlation ($r = 0.644$, $p < 0.001$) between ICT resources and integration among secondary school teachers. Likewise, Salina J. Bartilol et al. (2025) found a significant but weaker relationship ($r = 0.240$), indicating that the strength of this association may vary depending on educational level and context. These findings collectively reinforce the idea that resource availability is a key determinant of ICT integration.

Furthermore, additional studies support the same pattern across different settings. Edison B. Estigoy (2021) and Marijana Momčilović with S. Ninković (2024) both confirmed that ICT infrastructure significantly influences classroom integration practices. Similarly, Yousif Alshumaim and Riyadh Alhassan (2010) emphasized that access to computer laboratories and proper training directly affects teachers' ability to use ICT effectively. Overall, the literature consistently shows that while the strength of the relationship may differ across contexts, ICT resource availability remains a critical factor in successful ICT integration.

Table 20. Relationship Between ICT Competence and ICT Integration (n = 100)

Variables Compared	Computed r-value	p-value	Decision	Interpretation
ICT Competence vs ICT Integration	0.70	0.000	Significant	Reject H_0

The findings indicate a significant relationship between teachers' ICT competence and ICT integration, as shown by an r-value of 0.70 and a p-value of 0.000. This result suggests a strong positive relationship, meaning that teachers who possess higher levels of ICT competence are more likely to effectively integrate technology into their teaching practices. Accordingly, the null hypothesis is rejected, reinforcing the idea that strengthening teachers' digital skills is essential for successful ICT integration in education.

This finding is strongly supported by several empirical studies conducted across different educational contexts. For instance, Vera Yuli Erviana et al. (2025) reported significant positive correlations between teachers' pedagogical and professional competencies and their use of digital technologies in instruction. Similarly, T. Bariu et al. (2022) found a statistically significant correlation ($r = 0.618$, $p < 0.005$) among university teachers, indicating that higher competence levels are associated with more effective ICT integration. These findings consistently suggest that ICT competence is a key determinant of technology use in teaching.

Moreover, additional studies reinforce this relationship across various educational levels. H. Beltrán (2022) identified a strong positive association between ICT skills and classroom integration, while Putri Rahma Dianti et al. (2025) and Felistas Mbithe Michael et al. (2016) both confirmed significant correlations in secondary school settings. Collectively, these studies support the conclusion that improving teachers' ICT competence significantly enhances their ability to integrate technology effectively into instructional practices.

Table 21. Relationship Between Support Systems and ICT Effectiveness (n = 100)

Variables Compared	**Computed r-value**	**p-value**	**Decision**	**Interpretation**
Support Systems vs ICT Effectiveness	0.60	0.002	Significant	Reject H_0

The findings reveal a significant relationship between support systems and ICT effectiveness, as indicated by an r-value of 0.60 and a p-value of 0.002. This suggests a moderate to strong positive relationship, meaning that the presence of administrative, technical, and peer support contributes meaningfully to the effective use of ICT in instructional practices. As support systems improve, teachers are more likely to use ICT effectively in their teaching, leading to the rejection of the null hypothesis and underscoring the importance of institutional and collegial support in educational technology implementation.

This finding is consistent with several empirical studies that highlight the role of support structures in enhancing ICT use. For instance, Drissia Chouit et al. (2017) reported a nearly similar correlation ($r = 0.59$, $p < .01$) between institutional support and ICT usage, reinforcing the strength of the relationship observed in the current results. In contrast, P. Moses et al. (2012) found weaker but still significant correlations for specific support components such as technical ($r = .171$) and administrative support ($r = .213$), suggesting that individual elements of support may have varying levels of influence on ICT use.

Moreover, further studies emphasize the broader impact of structured support systems. J. Lyanda et al. (2023) found that technological support systems significantly influence academic outcomes, while Zuraidah Baharuldin et al. (2020) demonstrated both direct and indirect effects of administrative support on teachers' ICT competence. Collectively, these studies confirm that while the strength of relationships may differ across specific support components, strong and well-coordinated support systems consistently play a crucial role in improving ICT effectiveness in education.

CONCLUSIONS AND RECOMMENDATIONS

The study concludes that ICT integration in Echague West District remains limited and largely superficial due to systemic challenges in infrastructure, teacher competence, and institutional support. Insufficient ICT resources, unreliable internet connectivity, and inadequate technical support hinder teachers' ability to consistently implement technology-based instruction. Although teachers possess basic ICT skills, gaps in pedagogical integration and uneven professional development limit the transformative use of technology in teaching. In addition, inconsistent administrative support, lack of structured collaboration, and weak policy alignment contribute to fragmented implementation. Time constraints, heavy workloads, and varying levels of digital literacy further affect teachers' readiness and motivation. While teachers demonstrate adaptability through individual coping strategies, these efforts are not enough to overcome the broader structural limitations, indicating the need for comprehensive and sustainable interventions.

In response, it is recommended that educational authorities prioritize investment in ICT infrastructure, including devices, connectivity, and technical support systems, to ensure equitable access across schools. Professional development programs should be enhanced to focus on both technical and pedagogical competencies through continuous, needs-based training and mentoring. School leaders must strengthen instructional leadership by establishing clear ICT policies, promoting collaboration through professional learning communities, and providing incentives for innovation. Measures to address workload and time constraints should also be implemented to allow teachers to effectively integrate ICT into their instruction. Furthermore, targeted programs to improve digital literacy and readiness, along with consistent policy alignment and monitoring, are essential. Overall, a holistic intervention program integrating infrastructure development, teacher capacity-building, and institutional support is necessary to achieve effective and sustainable ICT-based instruction.

ADVANCED RESEARCH

Future research should employ longitudinal or mixed-method approaches to examine the long-term impact of ICT integration on teaching effectiveness and student outcomes. It should also explore the role of emerging technologies, institutional readiness, and policy implementation in supporting sustainable and effective ICT-based instruction.

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