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Extent of ICT Integration and Instructional Challenges of Elementary School Teachers in Lower Calanasan

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Abstract

This study investigated the extent of ICT integration and the instructional challenges experienced by Grade 5 and 6 teachers in selected public elementary schools in Lower Calanasan District. Employing a descriptive-correlational-comparative research design, data were gathered using validated survey tools from both teachers and learners. Results revealed a high level of ICT integration, particularly in multimedia and digital tools. Challenges such as poor internet connectivity and limited access to functional ICT equipment were frequently encountered. Despite these, learners showed strong engagement and participation. A significant relationship was found between ICT use and equipment-related challenges. The findings highlight the need for context-specific instructional materials to support technology-enhanced teaching.

Keywords: *ICT integration, instructional challenges, rural education, learner engagement, instructional materials*

INTRODUCTION

The integration of Information and Communication Technology (ICT) in basic education has emerged as a critical factor in enhancing the quality and relevance of teaching and learning in the 21st century (UNESCO, 2019). ICT use in the classroom fosters interactive, learner-centered instruction, promotes student engagement, and develops digital literacy skills, particularly among elementary learners (Buabeng-Andoh, 2012). However, in rural and geographically isolated settings such as the Lower Calanasan District in Apayao, public elementary schools often operate under serious constraints, including limited digital infrastructure, intermittent internet access, and lack of professional training for teachers, which hinder meaningful ICT integration (Tinio, 2002).

This study investigates the extent to which Grade 5 and 6 teachers integrate ICT tools into their instructional practices and the

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challenges they face in doing so. It also explores whether a significant relationship exists between the level of ICT integration and the frequency or severity of challenges encountered. The findings of this study aim to contribute toward the development of localized, evidence-based instructional materials tailored to the realities of rural schools.

The theoretical foundation of this study is grounded in Technological Pedagogical Content Knowledge (TPACK), which suggests that effective teaching with technology requires a balanced and integrated understanding of content, pedagogy, and technology (Mishra & Koehler, 2006). Teachers must be able not only to use ICT tools but also to align them with pedagogical strategies and subject content to enhance learning outcomes. In rural contexts, however, this knowledge is often limited by systemic and infrastructural challenges.

Additionally, Rogers' (2003) Diffusion of Innovations Theory offers a lens to examine how new technologies are adopted—or resisted—by teachers based on their perceived usefulness, ease of use, and the socio-organizational environment. Teachers in disadvantaged settings may be slower to adopt ICT due to perceived risks, lack of support, or institutional resistance.

Finally, the study also draws from Constructivist Learning Theory, which posits that learners build knowledge through active, meaningful engagement (Vygotsky, 1978). ICT supports this by offering dynamic, multimedia-rich environments that can make learning more contextualized and participatory, even in multi-grade classrooms.

In sum, this study aims to generate practical insights on ICT integration that can lead to the creation of responsive instructional materials for remote and underserved schools.

METHODOLOGY

This study utilized a descriptive-correlational-comparative research design to investigate the extent of ICT integration in Grades 5 and 6 classrooms in selected public elementary schools in the Lower Calanasan District. The descriptive component aimed to systematically present the current state of ICT use, including the frequency and nature of digital tool usage, the challenges encountered by teachers, pupil engagement, and available support systems. Correlational analysis was employed to determine the relationship between the extent of ICT integration and the challenges faced by teachers, while comparative analysis explored differences across various classroom settings, such as multigrade and single-grade classes.

The study was conducted in geographically isolated schools with limited ICT infrastructure. Purposive sampling was used to select Grade 5 and 6 teachers actively using ICT in instruction, while total enumeration was applied for learner-respondents who had been exposed to ICT-supported lessons.

Data were gathered using a validated survey questionnaire structured into four parts: (1) extent of ICT integration, (2) challenges encountered by teachers, (3) learner responses, and (4) available support systems. Likert scales assessed frequency, degree of challenges, and availability of support. Ethical protocols were observed, including informed consent and confidentiality.

The data gathering procedure involved securing approval from education authorities, coordinating with teachers, administering the surveys, and validating responses through classroom-based observations where feasible. Completed instruments were reviewed for accuracy, encoded, and prepared for analysis.

For data analysis, descriptive statistics (frequency, percentage, mean, and standard deviation) summarized the variables. Pearson's Product Moment Correlation Coefficient (r) tested the relationship between ICT integration and challenges encountered. A null hypothesis stating no significant relationship between these variables was tested at a 0.05 level of significance. The results served as input for the development of instructional materials that are responsive to the unique needs of ICT-based teaching in rural schools.

Results and Discussion

This chapter presents the data gathered, analyzed, and interpreted in answers to the problems raised. The data were based on the responses given by the respondents through the distribution of survey questionnaire. Furthermore, it presents the findings of the study from which conclusions and recommendations were made.

Extent to Which Grade 5 and 6 Teachers in Selected Lower Calanasan Schools Incorporate ICT Tools in Their Classroom Instruction

The findings revealed a generally high extent of ICT integration among Grade 5 and 6 teachers in Lower Calanasan, with a composite mean of 3.51. Teachers scored highest in using laptops or desktops for lesson delivery (M = 4.03) and preparing multimedia materials in advance (M = 3.97), indicating strong engagement in digital instruction. Lower means were noted in integrating animations (M = 3.12) and providing QR codes or links (M = 2.61), suggesting areas for improvement. Despite infrastructure limitations, results align with Cabansag (2020), Mariano and Soriano (2022), and UNESCO (2021), highlighting the growing digital competence of rural educators. These findings underscore the importance of sustained ICT training and resources, particularly for advanced and interactive tools, as vital inputs for developing localized instructional materials.

Table 1. Extent to Which Grade 5 and 6 Teachers in Selected Lower Calanasan Schools Incorporate ICT Tools in Their Classroom Instruction

A. Use of Multimedia Presentations		
Indicators	**Mean**	**Descriptive Value**
1. I use PowerPoint slides to introduce or summarize lessons.	3.79	High
2. I play educational videos related to the topics being taught.	3.73	High
3. I present visual charts and diagrams using a projector or screen.	3.33	High
4. I integrate animation or motion graphics to explain abstract concepts.	3.12	Moderate
5. I use video clips or music to create interest in the lesson.	3.45	Moderate
6. I embed short audio explanations or narrations in presentations.	3.30	Moderate
7. I modify and customize multimedia materials to suit learner needs.	3.76	Moderate

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8. I let pupils watch video demonstrations of real-life applications.	3.42	High
9. I prepare multimedia materials ahead of time as part of lesson planning.	3.97	High
10. I evaluate the effectiveness of multimedia presentations after each lesson.	3.67	High
Composite Mean	**3.55**	**High**

B. Utilization of Educational Platforms and Websites		
Indicators	**Mean**	**Descriptive Value**
1. I regularly access DepEd Commons or similar platforms for lesson resources.	3.61	High
2. I use YouTube Edu or other curated video platforms for subject-specific content.	3.45	High
3. I guide pupils in using learning apps or online exercises.	3.39	High
4. I search for and download teaching guides and e-modules from the internet.	3.88	High
5. I encourage pupils to explore safe educational websites for research.	3.61	High
6. I use Google tools (e.g., Docs, Slides) for collaborative classroom activities.	3.27	High
7. I integrate online platforms like Kahoot or Quizziz for formative assessment.	2.67	Moderate
8. I provide links or QR codes to digital enrichment materials.	2.61	Moderate
9. I update my instructional content with current materials found online.	3.82	High
10. I require pupils to use mobile devices or computers to access digital lessons (when available).	3.94	High
Composite Mean	**3.43**	**High**

C. Use of Digital Tools and Equipment in Classroom Activities		
Indicators	**Mean**	**Descriptive Value**
1. I use laptops or desktops to show instructional content during class.	4.03	High
2. I allow pupils to interact with devices (e.g., tablets, phones) for guided activities.	3.88	High
3. I make use of speakers, projectors, or smart TVs in lesson delivery.	3.58	High
4. I teach pupils how to navigate basic computer functions relevant to learning.	3.55	High
5. I integrate ICT tools during performance tasks or group presentations.	3.48	High
6. I conduct class simulations using digital programs or apps.	3.09	Moderate
7. I adapt ICT tools based on the availability of resources in my school.	3.61	High
8. I maximize available ICT equipment despite logistical limitations.	3.48	High
9. I store and organize teaching materials digitally for reuse and revision.	3.33	High
10. I evaluate pupils' digital outputs such as presentations, videos, or posters.	3.58	High
Composite Mean	**3.56**	High
Overall Composite Mean	**3.51**	**HIGH**

Assessment on the Challenges Encountered by Teachers in Integrating ICT As a Teaching Strategy, Especially in Multi-Grade or Grade-Specific Contexts

The findings reveal that teachers in Lower Calanasan schools face moderate to frequent challenges in ICT integration, with a composite mean of 3.22. The most significant barrier is limited internet connectivity (M = 3.45), echoing Fabito and Pacis (2021), followed by inadequate ICT equipment (M = 3.36), consistent with David and Mendoza (2020). Training-related challenges (M = 3.10) reflect evolving needs from basic ICT skills to pedagogical application (Torres & Dizon, 2022). Time constraints (M = 3.09) and limited institutional support (M = 3.12) further hinder full integration, as noted by Calderon and Mercado (2021) and SEAMEO-INNOTECH (2020). These systemic and contextual barriers underscore the need for localized, responsive instructional materials and policy support to sustain meaningful ICT integration in rural classrooms.

Table 2. Assessment on the Challenges Encountered by Teachers in Integrating ICT As a Teaching Strategy, Especially in Multi-Grade or Grade-Specific Contexts

A. Inadequate Availability or Functionality of ICT Equipment		
Indicators	**Mean**	**Descriptive Value**
1. Our school lacks sufficient computers, projectors, or other ICT devices.	3.64	Often a Challenge
2. The available ICT tools are often outdated or in need of repair.	3.58	Often a Challenge
3. We experience frequent power interruptions that affect ICT use.	3.39	Often a Challenge
4. The classrooms are not equipped with outlets or space for digital devices.	3.27	Often a Challenge
5. We lack printers, scanners, or supporting devices for ICT integration.	3.33	Often a Challenge
6. I often compete with other teachers to access limited ICT equipment.	3.12	Sometimes a Challenge
7. Malfunctioning ICT tools disrupt	3.42	Often a

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my teaching plans.		Challenge
8. There are no designated rooms for ICT-supported classes.	3.12	Sometimes a Challenge
9. Technical assistance is rarely available when ICT tools malfunction.	3.39	Often a Challenge
10. There is no regular maintenance or inventory of ICT tools in the school.	3.33	Often a Challenge
Composite Mean	**3.36**	**Often a Challenge**

B. Limited or Unreliable Internet Connectivity

Indicators	Mean	Descriptive Value
1. The school has no stable internet connection.	3.64	Often a Challenge
2. The signal strength in our school area makes it hard to access online resources.	3.70	Often a Challenge
3. I cannot download or stream educational videos due to slow internet.	3.67	Often a Challenge
4. I have to use personal mobile data to access instructional materials.	3.27	Often a Challenge
5. Online platforms take too long to load, delaying class activities.	3.52	Often a Challenge
6. The lack of Wi-Fi coverage in classrooms limits my ICT use.	3.45	Often a Challenge
7. I refrain from using online tools because of frequent disconnections.	3.15	Sometimes a Challenge
8. Internet problems force me to shift back to traditional methods.	3.30	Often a Challenge
9. I cannot use cloud-based teaching resources due to low bandwidth.	3.18	Sometimes a Challenge
10. Students cannot engage in digital activities due to lack of internet access at home.	3.61	Often a Challenge
Composite Mean	**3.45**	**Often a Challenge**

C. Lack of Sufficient Training or Confidence in Using ICT

Indicators	Mean	Descriptive Value
1. I have not received formal training on using ICT in the classroom.	3.00	Sometimes a Challenge
2. I am unsure how to incorporate digital tools in lesson planning.	3.21	Sometimes a Challenge
3. I find it difficult to troubleshoot technical problems during class.	3.33	Often a Challenge
4. I need more practice in using ICT tools confidently during teaching.	3.70	Often a Challenge
5. I fear that I might make mistakes while using digital equipment in front of pupils.	3.24	Sometimes a Challenge
6. I do not know how to evaluate pupils' performance using ICT tools.	2.76	Sometimes a Challenge
7. I feel overwhelmed by the variety of platforms and tools available.	2.76	Sometimes a Challenge
8. I am not confident in aligning ICT use with curriculum goals.	3.09	Sometimes a Challenge
9. I hesitate to integrate ICT because I might not maximize its potential.	2.97	Sometimes a Challenge
10. I lack peer or administrative support in improving my ICT skills.	2.94	Sometimes a Challenge
Composite Mean	**3.10**	**Sometimes a Challenge**

D. Time Constraints and Workload Pressures

Indicators	Mean	Descriptive Value
1. I do not have enough time to prepare ICT-integrated lessons.	3.03	Sometimes a Challenge
2. ICT-based lesson planning adds to my already heavy workload.	2.94	Sometimes a Challenge
3. Using ICT during classes consumes too much time due to setup issues.	3.33	Often a Challenge
4. I often skip ICT integration due to tight daily schedules.	3.12	Sometimes a Challenge
5. Preparing digital materials takes more time than preparing traditional ones.	3.21	Sometimes a Challenge
6. I find it difficult to balance ICT use with other teaching demands.	3.24	Often a Challenge
7. I prioritize coverage of the syllabus over ICT integration.	2.85	Sometimes a Challenge
8. ICT tools interrupt the flow of my lesson when not properly set up.	3.09	Sometimes a Challenge
9. I lack time to explore new ICT strategies or tools for teaching.	3.09	Sometimes a Challenge
10. Administrative tasks prevent me from focusing on ICT-enhanced instruction.	2.97	Sometimes a Challenge
Composite Mean	**3.09**	**Sometimes a Challenge**

E. Lack of Institutional and Policy Support

Indicators	Mean	Descriptive Value
1. Our school has no clear ICT implementation plan or policy.	3.27	Often a Challenge
2. There is limited encouragement from school leaders to use ICT.	3.06	Sometimes a Challenge

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3. ICT use is not included in our regular classroom observation criteria.	3.00	Sometimes a Challenge
4. There is no budget allocated for upgrading or purchasing ICT tools.	3.18	Sometimes a Challenge
5. ICT-related initiatives are often overlooked in school improvement plans.	3.18	Sometimes a Challenge
6. There are no designated ICT coordinators to assist teachers.	2.85	Sometimes a Challenge
7. Incentives for teachers using ICT are lacking.	3.36	Often a Challenge
8. There are no school-wide programs promoting digital integration.	3.18	Sometimes a Challenge
9. Collaboration among teachers on ICT integration is not encouraged.	3.00	Sometimes a Challenge
10. Feedback from supervisors does not emphasize ICT effectiveness.	3.09	Sometimes a Challenge
Composite Mean	**3.12**	**Sometimes a Challenge**
OVERALL COMPOSITE MEAN	3.22	**Sometimes a Challenge**

Teachers' Responses To ICT-Based Teaching Strategies in Terms of Their Engagement and Participation.

The findings show consistently high levels of pupil engagement and participation during ICT-based instruction, with an overall mean of 3.72 ("Always"). In the Engagement and Interest domain (M = 3.93), pupils showed increased attentiveness, curiosity, and focus when multimedia tools were used, confirming ICT's positive cognitive impact. Although pupils asked fewer questions (M = 3.24), active listening and interest remained high. In Participation and Collaboration (M = 3.51), learners enthusiastically joined group ICT tasks, though hesitancy in operating devices (M = 3.18) suggests varying digital confidence. These outcomes affirm that ICT fosters interactive, learner-centered environments, aligning with Valdez and Hermosa (2021), who noted increased motivation through multimedia use, and Alvarez and Cabarles (2020), who highlighted digital tools' role in enhancing learner autonomy and interaction. The results support the continued use of ICT in instruction and emphasize its value in developing localized Instructional Materials (IMD) tailored to rural learner engagement.

Table 3. Assessment on Teachers' Responses to ICT-Based Teaching Strategies in terms of their Engagement and Participation.

A. Engagement and Interest		
Indicators	**Mean**	**Descriptive Value**
1.Pupils show increased attentiveness when digital tools are used during lessons.	4.33	Always
2. Pupils display excitement or curiosity when lessons involve multimedia content.	4.33	Always
3. Pupils focus better on tasks when ICT is integrated into instruction.	4.33	Always
4. Pupils ask more questions during ICT-supported activities.	3.24	Often
5. Pupils appear more motivated to complete assigned work using ICT.	4.09	Always
6. Pupils react positively when presented with audio-visual instructional materials.	3.61	Always
7. Pupils actively listen when digital materials are being used.	4.03	Always
8. Pupils participate more during ICT-based interactive games or quizzes.	3.91	Always
9. Pupils are less distracted during technology-enhanced lessons.	3.42	Always
10. Pupils enjoy learning more when ICT tools are used.	4	Always
Composite Mean	**3.93**	**Always**
B. Participation and Collaboration		
Indicators	**Mean**	**Descriptive Value**
1. Pupils engage more actively in class when using digital tools.	3.79	Always
2. Pupils participate enthusiastically in group activities involving ICT.	4.06	Always
3. Pupils are willing to take roles (e.g., presenter, navigator) in ICT-based tasks.	3.47	Always
4. Pupils volunteer to operate digital devices during group work.	3.18	Often
5. Pupils collaborate well with peers in completing tasks using ICT.	3.18	Often
6. Pupils express their ideas more freely through digital presentations or outputs.	3.29	Always
7. Pupils take initiative in exploring digital resources provided by the teacher.	3.5	Always
8. Pupils help each other in operating basic ICT tools (e.g., opening files, playing videos).	3.65	Always
9. Pupils show teamwork during ICT-enhanced performance tasks.	3.56	Always

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10. Pupils demonstrate leadership when engaged in technology-integrated activities.	3.44	Always
Composite Mean	**3.51**	**Always**
OVERALL COMPOSITE MEAN	**3.72**	**Always**

Support Systems Currently Available to Teachers to Facilitate ICT Integration in Instruction

ICT support systems in Lower Calanasan schools are inconsistently available, with an overall composite mean of 3.16 ("Sometimes Available"). Access to digital learning resources rated highest (M = 3.22), with ICT-based lesson exemplars relatively accessible (M = 3.55), though centralized repositories remain lacking (M = 2.91), echoing Cabero-Almenara et al. (2020). Professional development opportunities were occasionally present (M = 3.20), with external training supported (M = 3.55), but limited in-house training and peer mentoring (M = 2.88–2.97), aligning with Salandanan and Estrella (2021). Infrastructure and equipment access was lowest (M = 3.05), hindered by unstable electricity (M = 2.76) and insufficient technical support (M = 2.91), reflecting Bernardo and Adalem's (2020) findings. These results underscore the need for stronger, school-based ICT support—such as sustained training, reliable infrastructure, and digital content hubs—to embed ICT meaningfully into instruction and guide localized Instructional Materials Development (IMD).

Table 4. Support Systems Currently Available to Teachers to Facilitate ICT Integration in Instruction

A. Access to Professional Development and Training		
Indicators	**Mean**	**Descriptive Value**
1. I have attended ICT integration training sessions organized by DepEd or the school.	3.39	Often Available
2. The school supports teachers' participation in external ICT-related seminars.	3.55	Often Available
3. I receive regular updates on new teaching technologies and platforms.	3.12	Sometimes Available
4. There are peer mentoring or coaching sessions for ICT usage in teaching.	2.97	Sometimes Available
5. The school conducts in-house training on using digital tools for instruction.	2.88	Sometimes Available
6. I am given opportunities to share best practices on ICT integration with colleagues.	2.91	Sometimes Available
7. The school encourages continuous learning on technology use in education.	3.12	Sometimes Available
8. ICT competency is part of teacher development goals or performance reviews.	3.52	Often Available
9. Feedback from supervisors includes suggestions for improving ICT integration.	3.27	Often Available
10. I can request technical or instructional guidance when exploring ICT tools.	3.3	Often Available
Composite Mean	**3.2**	**Sometimes Available**
B. Availability of Infrastructure and Equipment		
Indicators	**Mean**	**Descriptive Value**
1. The school has functioning ICT equipment (e.g., laptops, desktops, projectors).	3.36	Often Available
2. Classrooms have power outlets to support use of ICT tools.	2.94	Sometimes Available
3. There is a designated ICT room or learning resource center in the school.	3.09	Sometimes Available
4. A sufficient number of digital devices is available for teacher use.	3	Sometimes Available
5. There is a stable electricity supply that supports ICT activities.	2.76	Sometimes Available
6. Technical support personnel are available to assist with ICT concerns.	2.91	Sometimes Available
7. ICT tools are accessible upon request or reservation.	3.12	Sometimes Available
8. Digital tools are secured and maintained regularly.	3.09	Sometimes Available
9. There is a budget allocation for ICT improvement or procurement.	3.15	Sometimes Available
10. Spare devices or backup tools are available when needed.	3.03	Sometimes Available
Composite Mean	**3.05**	**Sometimes Available**
C. Access to Digital Learning Resources and Materials		
Indicators	**Mean**	**Descriptive Value**
1. The school provides printed guides or manuals on how to use digital tools.	3.3	Often Available
2. Online teaching resources (e.g., modules, presentations, e-books) are shared regularly.	3.33	Often Available
3. ICT-based lesson exemplars are available for reference.	3.55	Often Available
4. Educational software or apps are pre-installed in school devices.	3.18	Sometimes Available
5. The school maintains a repository of digital instructional materials.	2.91	Sometimes Available
6. I am provided with USB drives, storage devices, or cloud access for teaching materials.	3.27	Often Available

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7. I receive updated links to DepEd online resources and platforms.	3.15	Sometimes Available
8. Our school collaborates with DepEd divisions or other schools for shared ICT content.	3.09	Sometimes Available
9. I can access free or licensed digital content for classroom use.	3.12	Sometimes Available
10.There are offline alternatives available when internet access is not possible.	3.27	Often Available
Composite Mean	**3.22**	**Sometimes Available**
OVERALL COMPOSITE MEAN	**3.16**	**Sometimes Available**

Association Between the Extent of ICT Integration and the Challenges Encountered by Grade 5 And 6 Teachers in the Implementation of ICT in Teaching

Revealed in the table below is the significant correlations between the extent of ICT integration and equipment-related challenges among Grade 5 and 6 teachers. A moderate positive correlation was found between multimedia use and equipment limitations ($r = .419$, $p = .015$), suggesting that greater reliance on multimedia heightens the demand for functional ICT tools—a trend noted by Flores and Moreno (2021). A stronger correlation emerged between the use of educational platforms and equipment access issues ($r = .563$, $p = .001$), reinforcing Pascual and Laxamana's (2022) findings that increased digital platform use magnifies infrastructure deficiencies. No significant associations were observed between ICT integration and other challenges, such as internet connectivity or time constraints, implying teachers' adaptability despite such barriers. Overall, hardware availability appears most critical in sustaining ICT integration. These insights underscore the urgency of addressing equipment gaps to support digital instruction and guide the development of context-specific Instructional Materials Development (IMD) in resource-constrained schools.

Table 5. Correlation Result on the Association Between the Extent of ICT Integration and the Challenges Encountered by Grade 5 And 6 Teachers in the Implementation of ICT in Teaching

Extent of ICT integration	**Test Statistic**	**Challenges Encountered in ICT Integration**				
		A. Inadequate Availability or Functionality of ICT Equipment	**B. Limited or Unreliable Internet Connectivity**	**C. Lack of Sufficient Training or Confidence in Using ICT**	**D. Time Constraints and Workload Pressures**	**E. Lack of Institutional and Policy Support**
A. Use of Multimedia Presentations	Pearson Correlation	**.419***	-0.164	-0.051	-0.052	-0.190
	Probability value	**0.015**	0.361	0.776	0.776	0.290
B. Utilization of Educational Platforms and Websites	Pearson Correlation	**.563****	-0.149	-0.009	-0.329	-0.073
	Probability value	**0.001**	0.407	0.961	0.061	0.688
C. Use of Digital Tools and Equipment in Classroom Activities	Pearson Correlation	0.262	0.007	0.019	0.026	-0.245
	Probability value	0.140	0.970	0.915	0.888	0.169
****. Correlation is significant at the 0.01 level (2-tailed).**						
***. Correlation is significant at the 0.05 level (2-tailed).**						

Conclusions

The study confirmed that ICT was effectively utilized by Grade 5 and 6 teachers in selected schools of the Lower Calanasan District. High levels of ICT integration were evident in the use of multimedia, digital tools, and online platforms. Despite challenges like poor internet connectivity and limited infrastructure, teachers consistently incorporated ICT into their lessons. Learners showed strong engagement and motivation during ICT-based instruction. A significant inverse relationship was found between ICT use and perceived challenges, suggesting increased integration reduced difficulty. These findings emphasize the need for contextualized, ICT-enhanced instructional materials to sustain technology-driven, learner-centered teaching in remote settings.

Recommendations

In light of the findings, it is recommended that the Department of Education strengthen ICT integration policies in line with BEDP 2030, focusing on infrastructure, equipment, and teacher training in remote areas. School heads should address specific ICT needs, enhance connectivity, and support instructional supervision. Curriculum developers must design culturally responsive, offline-accessible, and locally relevant ICT-enhanced materials for multigrade classrooms. Teachers are encouraged to pursue digital pedagogy training and collaborate through peer mentoring. Lastly, future researchers should replicate this study in similar contexts, explore learner digital literacy, and assess the long-term impact of ICT on instructional quality and learning outcomes.

Declaration of No Conflict of Interest

The author hereby declares that this study is her original work and she states that there were no conflicts of interests.

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