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IMPLEMENTATION OF ICT-BASED INSTRUCTION AMONG KEY STAGE 2 TEACHERS IN THE PROVINCE OF SORSOGON: AN ASSESSMENT

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ABSTRACT

The integration of Information and Communication Technology (ICT) in education is a global priority aligned with UN Sustainable Development Goals 4 and 9, yet significant digital divides persist, particularly in developing regions like the Philippines. This study examined the implementation of ICT-based instruction among Key Stage 2 teachers in selected medium-sized public elementary schools across the 1st and 2nd Congressional Districts of Sorsogon Province. It assessed the extent of ICT use, teachers' pedagogical skills, instructional effectiveness, and implementation challenges. Using a descriptive-correlational design, survey questionnaires were administered to 156 Grade 4–6 teachers selected through total enumeration sampling during Academic Year 2025–2026. Results revealed that teachers often used basic digital tools, such as laptops and multimedia presentations, but consistently underutilized advanced platforms, including Learning Management Systems and digital assessment tools. Teachers demonstrated high digital literacy and pedagogical competence, though gaps persisted in troubleshooting and formative feedback. ICT-based instruction was rated as Very Effective across learner engagement, instructional efficiency, and learning

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outcomes. Challenges included unstable internet connectivity, limited technical support, and workload constraints. No significant relationship was found between the extent of ICT implementation and instructional effectiveness. The study concludes that sustainable ICT integration depends more on targeted teacher capacity-building than on hardware provision alone, underscoring the need for the proposed Sorsogon ICT Empowerment and Integration Program (SICT-EIP).

Keywords: *ICT-based instruction, digital literacy, pedagogical skills, learner engagement, teacher capacity-building, Sorsogon Province*

INTRODUCTION

Background of the Study

The integration of Information and Communication Technology (ICT) in education has become a vital global priority in the 21st century, fundamentally reshaping teaching and learning approaches. As societies advance into a digital era, educational systems worldwide acknowledge ICT as essential for improving academic quality, increasing accessibility, and equipping students for technology-driven economies. This aligns with United Nations Sustainable Development Goal 4 (SDG 4), which aims to ensure inclusive and equitable quality education by 2030, with 94% of advanced educational institutions globally recognizing ICT's strategic role (Diversity for Social Impact, 2023; United Nations, 2025). SDG 9, which focuses on building resilient infrastructure and fostering innovation, further underscores the need for robust ICT infrastructure in educational settings (United Nations, 2025).

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Despite significant progress—with 95% of the world's population having access to mobile broadband networks by 2024—persistent digital divides remain a critical concern. Approximately 2.4 billion people still lack reliable internet connectivity, and nearly 1 billion have no dependable electricity supply (Gaia Education, 2024; United Nations, 2025). These challenges are particularly acute in developing regions, where infrastructural limitations, insufficient teacher training, and socioeconomic disparities continue to impede ICT's educational potential.

Research demonstrates that ICT-enabled learning environments facilitate personalized instruction, enhance student engagement, and promote critical thinking skills essential for 21st-century learners (Küfeoğlu, 2022). Emerging technologies such as artificial intelligence, virtual reality, and adaptive learning platforms have proven particularly effective, with 87% of teachers in advanced economies observing significant improvements in student engagement when employing AI-driven personalized learning strategies (Diversity for Social Impact, 2022).

In the Philippine setting, ICT integration in basic education has been a central component of educational reform. The Department of Education (DepEd) has implemented various initiatives, including the DepEd Computerization Program (DCP) and the Digital Rise Program, which provide computer packages, training programs, and support for ICT literacy in public schools (DepEd, 2025). DepEd Order No. 89, Series of 2025, established guidelines for teacher performance management that incorporate technological competencies as essential elements of professional practice. Recent legislative developments, particularly Republic Act 11927 (2022), have mandated a shift from traditional ICT skills training to

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comprehensive digital skills development (Espinosa et al., 2025). Despite these commitments, as of 2022, 1,635 schools remained without power grid connections, and teachers in disadvantaged areas continue to use personal devices to compensate for inadequate school resources (Cabico, 2022; Espinosa et al., 2025).

The Bicol Region presents a unique context for examining ICT integration in elementary education, characterized by distinct socio-cultural dynamics, infrastructural constraints, and localized responses. Implementation challenges include power outages, unreliable electricity supply, and vulnerability to typhoons. Despite these obstacles, educators have demonstrated creativity—using electronic flashcards on television screens, gamifying lessons through platforms like Quizizz, and leveraging social media applications for student performance tasks (UNESCO, 2024; Espinosa et al., 2025).

Sorsogon Province, the southernmost province of the Bicol Region, faces unique challenges due to geographic isolation and limited connectivity. The Schools Division of Sorsogon has implemented various ICT initiatives aligned with national priorities, including training programs on Microsoft productivity tools and culturally responsive learning material development (DepEd Sorsogon City, 2025). However, the systematic assessment of ICT implementation among Key Stage 2 teachers remains limited. This study addresses that gap by examining current practices, identifying challenges and opportunities, and providing evidence-based recommendations to enhance ICT-based instruction in the province.

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MATERIALS AND METHODS

Research Methodology

This section presents the methods and procedures used in conducting the study. It describes the research design, study site, respondents, sampling technique, research instrument, data-gathering procedure, and data analysis plan employed to obtain valid and reliable results on the integration of ICT-based instruction into weekly lesson delivery among public elementary school teachers in Sorsogon Province. These methodological components were carefully selected and systematically applied to ensure that the data collected accurately reflected the actual state of ICT integration in the classroom, captured the challenges teachers face, and produced findings that are both credible and meaningful. Together, they form a coherent research framework to generate evidence-based insights that inform targeted interventions and policy decisions to strengthen ICT-based instruction across the province.

Research Design

This study employed a descriptive-correlational research design using a quantitative approach. The descriptive component determined the extent of ICT utilization, teachers' pedagogical competencies, the effectiveness of ICT-based instruction, and the challenges public elementary school teachers in Sorsogon Province face. The correlational component tested whether a significant relationship existed between the extent of ICT implementation and the effectiveness of weekly lesson delivery (Padillo et al., 2021).

This design was appropriate because it enabled the researcher to describe the current status of ICT implementation and to statistically analyze relationships among variables without

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manipulating any condition or intervention (Mtebe et al., 2021). Descriptive-correlational research allowed researchers to observe and measure variables in their natural settings to identify patterns and relationships (Guillén-Gámez et al., 2021). The design also supported hypothesis testing, aligning with the study's objective to determine the association between ICT use and instructional effectiveness (Lund, 2021). According to Pérez-Navío et al. (2021), this methodological approach was particularly suitable for examining teachers' digital competencies and their relationship with pedagogical practices in educational settings.

Participants of the Study

The respondents of this study were Key Stage 2 (Grade 4–6) teachers in selected medium-sized public elementary schools within the 1st and 2nd Congressional Districts of Sorsogon Province who were actively engaged in classroom instruction and lesson preparation using ICT. These teachers were directly responsible for planning, organizing, and delivering weekly lessons and thus served as the primary source of information on the extent and effectiveness of ICT-based instruction.

The inclusion criteria were: (a) at least one year of teaching experience, (b) regular involvement in weekly lesson delivery, and (c) access to or experience using ICT tools in classroom instruction. Teachers on special assignments or not engaged in actual teaching were excluded to ensure that all participants had firsthand experience relevant to the study variables.

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Sampling Design

The study employed total enumeration sampling, which involved including all Key Stage 2 teachers in selected medium-sized public elementary schools in Sorsogon Province who were responsible for classroom instruction using ICT during the study period. This technique was selected to ensure that data reflected the full range of perspectives and experiences of the entire teacher population within the defined scope.

Because the number of qualified respondents was manageable and clearly defined, total enumeration was deemed appropriate for obtaining a comprehensive understanding of the challenges, adaptive strategies, and opportunities encountered by teachers. This approach strengthened the accuracy and credibility of the findings by eliminating sampling bias and ensuring that all available sources within the target group were represented (Mtebe et al., 2021).

Research Instrument

The study employed a self-developed, structured questionnaire, validated by experts and reliability-tested, to measure teachers' integration of ICT into weekly lesson delivery. Using a 4-point Likert scale to avoid neutrality, the instrument covered four areas: (1) extent of ICT use in lesson planning, presentation, and assessment, rated from 4 (Always) to 1 (Never); (2) teachers' competence in digital literacy, lesson design, and alignment with MELCs, rated from 4 (Highly Competent) to 1 (Not Competent); (3) effectiveness of ICT integration in improving organization, engagement, efficiency, and outcomes, rated from 4 (Very Effective) to 1 (Not Effective); and (4) challenges encountered, including facilities,

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connectivity, support, and training, rated from 4 (Strongly Agree) to 1 (Strongly Disagree). Weighted means were computed to determine overall levels of utilization, competence, effectiveness, and barriers, ensuring consistency, objectivity, and efficiency in data collection while supporting hypothesis testing on the relationship between ICT use and lesson delivery effectiveness.

Validity of the Research Instrument

The questionnaire underwent a rigorous validation process to establish content validity and reliability. First, the instrument was submitted to a panel of experts composed of experienced educators, ICT specialists, and research methodologists, who evaluated the clarity, relevance, and appropriateness of each item relative to the study's objectives. The experts' feedback and suggestions were carefully reviewed and incorporated into the revised instrument.

Following expert validation, pilot testing was conducted in selected medium-sized public elementary schools in a nearby province whose teachers shared comparable demographic and professional characteristics with the target population in Sorsogon Province—including similar school classifications, grade-level assignments, and levels of ICT access—without compromising the integrity of the actual study sample. Permission was secured from the Schools Division Superintendent and respective school heads of the pilot schools prior to pilot testing. Pilot respondents were informed that their participation was solely for instrument refinement and that their responses would not form part of the final data set.

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Data from the pilot testing was used to assess the instrument's internal consistency and reliability. The results confirmed that the questionnaire had acceptable reliability. Items with low item-total correlations were revised or removed to strengthen the instrument's overall coherence. Only after this comprehensive validation and reliability testing process was completed was the final version of the questionnaire prepared for administration.

Data Gathering Procedures

Before the study was conducted, formal approval was secured from the Schools Division Superintendent of Sorsogon Province. Subsequently, permission was obtained from the respective school heads of the selected public elementary schools. Informed consent was obtained from all teacher-participants, ensuring that their participation was voluntary and that they were fully informed of the study's purpose, the nature of their involvement, the confidentiality of their responses, and their right to withdraw at any time without penalty.

The validated survey questionnaire was then administered to the participants. Prior to administration, the researcher explained the research protocol, provided clear instructions for answering the instrument, and addressed any questions to ensure clarity and understanding. Respondents were given sufficient time to complete the questionnaires to avoid undue pressure and to promote accurate and honest responses. The researcher strictly adhered to the approved research protocol throughout data collection to ensure consistency, ethical compliance, and minimal disruption to regular school activities.

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Data collection was conducted over one month. After collection, all responses were systematically reviewed for completeness and accuracy, then manually organized, coded, and tabulated for statistical analysis.

Data Analysis

Descriptive statistics were employed to describe and interpret the quantitative data obtained from the teachers' responses. The weighted mean was used to determine the overall level of responses for each instrument indicator, while the standard deviation measured the degree of variation or consistency in responses. These statistical tools provided a clear understanding of teachers' level of ICT utilization, their competence in ICT integration, the effectiveness of ICT-based instruction, and the challenges encountered in weekly lesson delivery.

To determine whether a significant statistical relationship existed between the extent of ICT utilization and the effectiveness of weekly lesson delivery, the Pearson Product–Moment Correlation Coefficient (r) was employed. This inferential statistical test is appropriate for continuous data derived from Likert-scale responses and was used to assess both the strength and direction of the relationship between the two main variables of the study. The hypothesis was tested at the 0.05 significance level. A computed p-value less than 0.05 indicated a significant relationship, leading to the rejection of the null hypothesis; a p-value greater than 0.05 indicated no significant relationship. All statistical results were presented in tabular form and supported by interpretive narratives.

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RESULTS AND DISCUSSIONS

Summary of the Study

The study's results reveal a nuanced picture of ICT integration among teachers in Sorsogon Province. While basic tools such as laptops and video platforms are consistently embedded in classroom practice, more advanced platforms, such as learning management systems, online quizzes, and communication apps, remain underutilized. In the 1st Congressional District, teachers often use ICT tools, with laptops and video platforms rated "Always," but tablets, projectors, and LMS only "Often," the latter scoring lowest at 2.74. In contrast, the 2nd Congressional District demonstrates stronger integration, with four out of five indicators rated "Always," though LMS use still lags behind at 3.00. This uneven adoption highlights systemic barriers, including poor connectivity, limited training, and weak institutional support.

When examining the frequency of ICT use, both districts fall within the "Often" range, with multimedia presentations and instructional videos consistently rated "Always." However, online quizzes scored lowest, with the 1st District rating them "Rarely" at 2.47, and the 2nd District rating them only "Often" at 2.97. This indicates that digital assessment remains the weakest dimension of ICT-based instruction, limiting opportunities for data-driven teaching. Similarly, digital worksheets and online communication platforms are inconsistently used, suggesting that ICT integration is still largely delivery-oriented rather than interactive or learner-centered.

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Despite these gaps, teachers in both districts consistently perceive that ICT positively influences learner performance on summative tests. The 1st District recorded an overall mean of 3.36, while the 2nd District scored higher at 3.62, with both rated "Always." Teachers believe ICT improves test scores, accuracy, comprehension, mastery, and consistency, with the stronger-performing 2nd District perceiving greater gains. This suggests that deeper ICT integration correlates with stronger perceived impacts on student achievement.

In terms of pedagogical skills, both districts were rated "Highly Competent" overall, though with notable differences. The 1st District scored 3.28, showing strength in using ICT tools and apps but weaker in troubleshooting and continuous skill improvement. The 2nd District scored higher at 3.48, with all indicators rated "Highly Competent," particularly in proactive digital skill development. This contrast implies that while teachers across the province possess functional digital literacy, the 2nd District is better positioned to adapt to evolving educational technologies.

Overall, the findings suggest that ICT integration in Sorsogon classrooms is present but uneven, anchored on familiar tools rather than pedagogically intentional strategies. Teachers recognize ICT's positive impact on learning outcomes, yet systemic barriers hinder deeper adoption. To move forward, professional development must prioritize digital assessment, learner engagement, and continuous skill growth, while institutional policies and infrastructure improvements are needed to ensure equitable and meaningful ICT integration across districts.

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Insights

The findings of this study yield several insights with implications for educational policy, professional development, and ICT integration theory in Philippine provincial schools. The results challenge the assumption that greater ICT use automatically leads to better instructional outcomes, as the weak correlation between the extent of ICT implementation and effectiveness (r = .13) indicates that what teachers do with technology matters more than the frequency or access to it. Both districts had similar resources yet produced different outcomes, underscoring the importance of pedagogical application. Teachers demonstrated strong competence in delivery tools such as multimedia presentations and videos, but showed consistent weaknesses in higher-order functions, including formative feedback, digital scoring, data-driven adjustment, and LMS adoption—reflecting a professional development culture focused on tool familiarity rather than pedagogical transformation. Contextual realities, particularly in the 1st District with its coastal and remote schools, unreliable connectivity, and older teaching force, moderated ICT integration quality and explained lower effectiveness despite strong engagement. Moreover, teacher motivation and administrative support, while necessary, proved insufficient without sustained training, reliable infrastructure, and institutional cultures that reward innovation. These findings affirm the Contextual ICT Integration Theory (CICIT), with principles such as Adaptive Resource Optimization and Contextual Embeddedness demonstrated in practice, particularly in the 2nd District's stronger outcomes despite comparable resources. Overall, the study highlights that effective ICT

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integration depends not on the quantity of technology but on its meaningful, context-sensitive, and pedagogically intentional use.

Recommendations

Based on the findings of this study, the following recommendations are advanced:

For Objective 1 (ICT-Based Instruction and LMS Integration), teachers should be required to embed LMS platforms as the central instructional ecosystem rather than supplementary tools. This means mandating the use of an LMS for lesson planning, formative and summative assessment, and communication, with division-wide monitoring of LMS adoption rates. Establish an "LMS Utilization Index" at the division level to track how LMS use translates into student outcomes, ensuring accountability and continuous improvement.

For Objective 2 (Pedagogical Competence and Skill Gaps), professional development must move beyond introductory ICT training toward competency-based certification programs in troubleshooting, formative assessment, and data-driven pedagogy. Create a tiered digital pedagogy certification system (basic, intermediate, advanced) that teachers must progress through, tied to promotion and performance evaluation.

To address gaps in collaboration and critical thinking under Objective 3 (Effectiveness and Student Engagement), ICT integration should prioritize interactive, participatory platforms such as collaborative whiteboards, peer-assessment tools, and gamified learning systems. Implement division-wide digital pedagogy labs where teachers co-design and pilot interactive ICT strategies, with outputs shared in a repository of best practices.

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For Objective 4 (Teacher Capacity vs. Resource Availability, since human capital is the decisive factor, investment should prioritize continuous coaching models over hardware procurement. Establish ICT Pedagogy Coaches in every district cluster, tasked with mentoring teachers weekly on translating technology access into learner-responsive instruction, supported by structured observation and feedback cycles.

For Objective 5 (Data-Driven Instructional), approaches Shift focus from hardware acquisition to data literacy and adaptive pedagogy. Integrate learning analytics dashboards into LMS platforms, training teachers to interpret student performance data in real time and adjust instruction accordingly. This should be coupled with mandatory workshops on evidence-informed teaching practices.

For Objective 6 (Sustainable and Equitable ICT Integration), ensure ICT programs are equity-focused by targeting underserved schools with tailored interventions. Launch a Digital Equity Grant Program that funds connectivity, training, and localized ICT solutions for remote schools, while requiring measurable outcomes in teacher competence and student achievement. Sustainability should be reinforced through policy alignment and by embedding ICT integration goals into school improvement plans and annual performance reviews.

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