

Information and Communication Technology (ICT) Literacy and Application Skills Among K to 3 Teachers

Janice Menzi Maliones

Tinaleb Elementary School, Tinalab, Ballay, Kabayan, Benguet, Philippines
Benguet State University, Bokod Campus, Ambangeg, Daklan, Bokod, Benguet, Philippines

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Email of Corresponding Author: janice.maliones@deped.gov.ph

Abstract

This study examined the Information and Communication Technology (ICT) literacy and application skills of K-to-3 teachers and explored the relationship between these competencies to inform targeted interventions. Anchored on the National ICT Competency Standard Framework (NICSF), the study employed a descriptive correlational research design. Data were collected from 30 K-to-3 teachers in public elementary schools using a researcher-developed questionnaire measuring ICT literacy and application across key areas such as word processing, spreadsheets, presentation tools, and pedagogical integration. Data analysis utilized weighted mean, Pearson Product-Moment Correlation, and t-test. Findings revealed that teachers exhibited a slightly literate level of ICT literacy (mean = 2.48) but a highly applied level of ICT application skills (mean = 3.57), indicating a gap between theoretical knowledge and actual practice. A strong positive correlation ($r = 0.68$, $p = 0.001$) was found between ICT literacy and application skills, confirming that higher literacy is associated with improved classroom application. The study also highlighted variability in pedagogical integration despite consistent use of basic ICT tools. The study concluded that K-to-3 teachers are practitioner-oriented users of ICT, demonstrating adaptability despite limited formal literacy. It recommends the implementation of targeted ICT enhancement training programs focusing on advanced technical skills and pedagogical integration, along with peer mentoring and expanded research scope. This study aligns with SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth), and SDG 9 (Industry, Innovation and Infrastructure) by promoting teacher digital competence and effective technology integration in education. It contributes to educational, technological, and institutional sustainability by strengthening teacher capacity, improving instructional quality, and supporting policy and training development for a future-ready education system.

Keywords: Application skills, ICT integration, ICT literacy, K-to-3 teachers, pedagogical competency, public elementary schools, technology operations, training needs

1. Introduction

Information and Communication Technology (ICT) has become integral to 21st-century education, shaping teaching practices, learning environments, and student outcomes. For K-to-3 teachers, ICT literacy and application skills are critical in fostering interactive, inclusive, and developmentally appropriate instruction. Despite global and national initiatives, disparities in ICT competence, access, and classroom integration persist, particularly in developing contexts. This study examines the ICT literacy levels and application skills of K-to-3 teachers and explores the relationship between these competencies to inform targeted interventions and policy development.

1.1 ICT Literacy and Application Skills among K-to-3 Teachers in the Study Context

The advancement of ICT has transformed educational systems, requiring teachers to develop competencies in digital tools to enhance instruction and assessment. Teachers with strong ICT skills can support differentiated learning and improve foundational literacy and numeracy among young learners (Voogt & Roblin, 2012). However, ICT literacy alone is insufficient; effective integration requires the ability to apply digital tools in pedagogy, classroom management, and student engagement (UNESCO, 2018). In developing contexts, teachers face barriers such as limited access to technology, inadequate training, and insufficient institutional support, which hinder ICT integration. These challenges are particularly critical in early education, where interactive and multisensory approaches are essential. Access to equipment, teacher attitudes, and competencies significantly influence ICT use, as described by 'first and second order barriers' (Ertmer 1999). Additionally, teachers must adapt to evolving pedagogical models, including online and blended learning environments (Toquero, 2020; Basilaia & Kvavadze, 2020). The pandemic further accelerated the demand for ICT competence, requiring teachers to upskill in digital instruction, communication, and resource development while addressing technical challenges and increased workload. Despite initiatives, ICT literacy among teachers remains inconsistent, with many demonstrating only basic competencies.

1.2 Related Literature on ICT Literacy and Application Skills of K-to-3 Teachers

Literature highlights that ICT integration enhances motivation, comprehension, and engagement, especially in early grades. However, effective use depends on teacher competence, training, and access to resources (UNESCO,2018). Persistent challenges such as limited ICT skills, lack of confidence, and insufficient infrastructure. Demographic factors such as age, gender, and educational background influence ICT literacy, with younger teachers generally demonstrating higher competence. In the Philippine context, teachers often exhibit only basic ICT proficiency and limited classroom integration. Sustained professional development, contextualized training, and institutional support are identified as key factors in improving ICT integration. Without these, teachers tend to use ICT for basic tasks rather than fostering higher-order thinking and collaborative learning (UNESCO.org, 2019; Konan, 2010).

1.3 Global, National, and Local Context of ICT Literacy and Application among K-to-3 Teachers

Globally, ICT integration is a priority in education systems, supported by frameworks such as the UNESCO ICT Competency Framework for Teachers (UNESCO,2018). In Southeast Asia, disparities in access, training, and resources continue to affect teacher competence and ICT use. In the Philippines, initiatives such as the DepEd Computerization Program, DepEd Commons, and ICT training programs aim to enhance digital education. However, implementation challenges persist, including inadequate infrastructure, slow internet connectivity, and limited access to child-friendly digital tools. Regionally, in the Cordillera Administrative Region, geographical and infrastructural constraints affect ICT adoption, with disparities between urban and rural schools. In Benguet, although digitalization efforts have increased exposure to ICT, teachers still face challenges related to limited devices, connectivity issues, and insufficient specialized training for early grade instruction. Variations in ICT competence among teachers contribute to inconsistent classroom integration, highlighting the need for localized assessment and intervention.

1.4 Theoretical and Conceptual Basis of ICT Literacy and Application Skills of K-to-3 Teachers

This study is anchored on the National ICT Competency Standard Framework (NICSF), which defines the knowledge, skills, and performance indicators required for effective ICT integration in teaching. The framework includes domains such as technology operations, instructional strategies, ethical and legal considerations, and professional development (Caluza, et.al (2017)). ICT competence encompasses technical skills in productivity tools, the ability to design and implement technology-supported learning environments, and adherence to ethical and legal standards in technology use. It also emphasizes continuous professional growth, collaboration, and innovation in teaching practices (UNESCO.org, 2019). The study adopts a correlational framework, examining the relationship between ICT literacy (knowledge and technical understanding) and ICT application skills (actual classroom use). It assumes that higher ICT literacy leads to more effective integration of digital tools in teaching and learning processes.

1.5 Research Gaps on ICT Literacy and Application Skills of K-to-3 Teachers and Study Rationale

Despite extensive research on ICT in education, there is limited focus on early grade teachers, particularly in localized contexts such as Benguet. Existing studies primarily address general teacher populations, overlooking the unique pedagogical needs of K-to-3 learners. Furthermore, gaps remain in understanding the relationship between ICT literacy and actual classroom application. While teachers may possess basic knowledge, their ability to effectively integrate ICT into instruction varies widely due to training, resources, and contextual factors. This study addresses these gaps by assessing both ICT literacy and application skills among K-to-3 teachers and examining their relationship. The findings aim to inform targeted training programs, improve resource allocation, and support policy development for early childhood education.

1.6 Alignment of ICT Literacy and Application Skills Study with Sustainable Development Goals (SDGs)

This study aligns with several Sustainable Development Goals: SDG 4 – Quality Education, by promoting effective teaching practices through ICT integration and enhancing learning outcomes. SDG 8 – Decent Work and Economic Growth, by strengthening teachers' digital competencies, which contribute to workforce readiness and productivity. SDG 9 – Industry, Innovation and Infrastructure, by supporting the integration of digital technologies in education systems. By addressing ICT literacy and application among teachers, the study contributes to improving educational quality and advancing digital transformation in education.

1.7 Multidisciplinary Sustainability Contribution of ICT Literacy and Application Skills among K-to-3 Teachers

This study contributes to educational sustainability by enhancing teacher competence and improving instructional quality in early education. It supports technological sustainability through the promotion of digital literacy and effective ICT integration. Additionally, it advances socio-economic sustainability by equipping educators with skills necessary for a digital society, thereby indirectly preparing learners for future economic participation. The study also contributes to institutional sustainability by informing policy development, training programs, and resource allocation within the education system. Overall, strengthening ICT literacy and application among K-to-3 teachers fosters a more resilient, adaptive, and future-ready education system.

2. Material and methods

2.1 Research Design

The study employed a descriptive correlational research design to examine the relationship between ICT literacy and ICT application skills among K-to-3 teachers. This design focuses on identifying the degree of association between variables without establishing causality. It is appropriate for assessing current levels of ICT literacy and application while determining the extent to which these variables are related. A questionnaire was utilized to measure the teachers' ICT literacy levels, their ICT application skills, and the relationship between these two variables.

2.2 Locale of the Study

The study was conducted in public elementary schools within Kabayan District. The respondents were distributed across nine schools, ensuring representation from different geographical areas within the district. Several schools contributed an equal number of teacher-participants, while a few had smaller representation. This distribution provided a broad perspective on ICT integration practices across various school settings rather than limiting the findings to a single institution.

2.3 Respondents of the Study

The respondents of the study were K-to-3 teachers from selected public elementary schools in Kabayan District. These teachers were chosen as they handle early grade learners and play a critical role in integrating ICT into foundational teaching and learning processes.

2.4 Sample and Sampling Procedure

A total of 30 K-to-3 teachers participated in the study. The respondents were selected using purposive sampling, ensuring that only teachers relevant to the study objectives were included. This method allowed the researcher to focus on individuals who have direct involvement in early grade instruction and ICT use in the classroom.

2.5 Research Instrument

The study utilized a researcher-developed questionnaire designed to assess both ICT literacy and ICT application skills among K-to-3 teachers. The instrument consisted of three parts. The first part gathered demographic information, including educational attainment, years of service, grade level taught, and access to ICT devices. The second part measured ICT literacy, focusing on teachers' theoretical knowledge and technical understanding of ICT tools. The third part assessed ICT application skills, examining the frequency and effectiveness of ICT use in teaching practices. The instrument covered five key areas: basic ICT and internet use, word processing, spreadsheets, presentation software, and integration of ICT in K-to-3 teaching and learning. ICT literacy was measured through self-assessment of knowledge, while ICT application skills were measured based on actual usage in practice. A 4-point Likert scale was used to ensure clear distinctions in responses and to prevent neutral answers.

2.6 Data Gathering Procedure

Data collection followed ethical standards to ensure voluntary participation and informed consent. Respondents were fully informed about the purpose and implications of the study and were given the freedom to withdraw at any stage. Consent from school heads was obtained prior to data collection. The questionnaire was carefully designed to avoid offensive or discriminatory language, and strict confidentiality and anonymity of respondents were maintained. The researcher ensured objectivity throughout the data collection and analysis process.

2.7 Data Analysis Techniques

The collected data were analyzed using appropriate statistical tools. Weighted mean was used to determine the overall levels of ICT literacy and ICT application skills. Pearson Product-Moment Correlation (r) was applied to examine the relationship between ICT literacy and ICT application skills. Additionally, a t-test was used to determine whether the observed relationship was statistically significant. A four-point scale was used to interpret the results, categorizing responses into levels ranging from not literate/applied to highly literate/applied, based on corresponding mean ranges. These categories described the extent of teachers' knowledge and their level of ICT utilization in teaching practices.

3. Results and Discussion

3.1 ICT Literacy and Application Skills of K-to-3 Teachers

3.1.1 ICT Literacy Level of K-to-3 Teachers

The results show that K-to-3 teachers have an overall ICT literacy level categorized as slightly literate, with an overall mean of 2.48. Among the components, word processing obtained the highest mean, indicating a moderately literate level, while spreadsheet application, presentation software, basic ICT and internet, and pedagogical competency were all rated as slightly literate. These findings indicate that teachers possess basic knowledge of ICT tools but have not yet developed advanced technical proficiency. This suggests that while teachers are familiar with ICT tools, they lack deeper technical

understanding and mastery of advanced features. The higher competence in word processing compared to other areas reflects reliance on commonly used tools, whereas lower confidence in spreadsheets, presentations, and pedagogical integration indicates a need for targeted training. The findings imply that teachers are actively using ICT but may not be maximizing efficiency due to limited literacy, highlighting the importance of focusing professional development on enhancing advanced skills and pedagogical application.

3.1.2 ICT Application Skills of K-to-3 Teachers

The findings reveal that K-to-3 teachers demonstrate a highly applied level of ICT skills, with an overall mean of 3.57. All components, including word processing, spreadsheet application, basic ICT and internet use, integrated ICT application, and presentation and multimedia, fall within the highly applied category. Word processing and spreadsheet applications recorded the highest means, while presentation and multimedia application obtained the lowest mean among the components, although still within the highly applied level. These results indicate that teachers consistently integrate ICT tools into their teaching and administrative tasks despite their limited theoretical knowledge. The strong performance in productivity tools suggests proficiency in routine tasks, while the lower scores and higher variability in integrated ICT application reflect differences in how teachers incorporate technology into instructional practices. This highlights the need for professional development that focuses on pedagogical integration to ensure more consistent and effective use of ICT in classroom instruction.

3.1.3 Comparison of ICT Literacy and ICT Application Skills

The results indicate a discrepancy between ICT literacy and application skills, with teachers rated as slightly literate but highly applied in their use of ICT. The overall mean for literacy is 2.48, while application skills have a significantly higher mean of 3.57. Additionally, the variation in literacy levels is higher compared to the relatively uniform application skills among teachers. This finding suggests that teachers have developed functional ICT skills through regular use rather than formal training. Their ability to apply ICT effectively despite limited theoretical knowledge reflects adaptability and practical learning. However, the gap between literacy and application indicates that teachers may not be using ICT tools efficiently or securely. This underscores the need for training programs that deepen teachers' understanding of ICT to enhance both efficiency and pedagogical effectiveness.

3.2 Relationship Between ICT Literacy and ICT Application Skills

The results show a strong positive correlation between ICT literacy and ICT application skills, with a Pearson r value of 0.68 and a p -value of 0.001, indicating a statistically significant relationship. This leads to the rejection of the null hypothesis and confirms that a relationship exists between the two variables. This implies that increases in ICT literacy are associated with improvements in ICT application skills. Although teachers demonstrate high application despite lower literacy, the significant correlation confirms that their use of ICT is supported by their underlying knowledge. Enhancing ICT literacy through structured training is therefore expected to further improve classroom application, reinforcing the importance of targeted ICT enhancement programs for K-to-3 teachers.

4. Conclusion & Recommendations

The findings indicate that K-to-3 teachers are practitioner-oriented users of ICT, demonstrating a slightly literate level of theoretical knowledge but a highly applied level of classroom utilization. Despite limited formal ICT literacy, teachers consistently integrate digital tools into their teaching practices, reflecting adaptability and functional competence. The significant relationship between ICT literacy and application skills confirms that improving teachers' theoretical knowledge will directly enhance the effectiveness of ICT integration in instruction.

Based on the findings, it is recommended that schools implement an ICT Enhancement Training Program specifically designed for K-to-3 teachers, focusing on identified areas such as advanced spreadsheet use, professional presentation design, and pedagogical competency. ICT coordinators should establish peer-mentoring systems to support teachers with lower competence levels, while teachers are encouraged to explore more interactive and multimedia tools to enhance instructional practices. Future researchers are advised to expand the scope of the study to include wider geographical areas and additional factors influencing ICT application, such as internet accessibility and availability of devices.

The study is limited to K-to-3 teachers within a specific district, which may restrict the generalizability of the findings to other contexts. Additionally, the study focuses primarily on ICT literacy and application skills without extensively examining other influencing factors such as infrastructure, internet connectivity, and resource availability, which may also affect ICT integration in teaching.

Compliance with ethical standards

The study adhered to established ethical standards throughout the research process. Participation was voluntary, and respondents were fully informed about the purpose and implications of the study. They were given the right to withdraw at any stage without any form of pressure. Consent was obtained prior to data collection, including approval from the respective school heads. The research instrument was carefully constructed to avoid offensive or discriminatory language, and strict confidentiality and anonymity of participants were maintained. Objectivity was observed in all stages of data collection and analysis.

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