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Teacher and Institutional Readiness for ICT Integration at Bambang II District: Basis for Instructional Technology Intervention

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Index Terms:

ICT competence, ICT integration, institutional readiness, microlearning, teacher readiness

Abstract. This study aimed to determine the teacher and institutional readiness in integrating ICT in the Bambang II district during the school year 2025-2026. Data were gathered using the descriptive-correlational research design from 104 public elementary school teachers who were selected using stratified random sampling. The researcher designed questionnaires based on the UNESCO ICT Competency Framework to evaluate the readiness of teachers and institutions in the integration of ICTs. The collected data were analyzed using mean and Spearman's rho. The teachers showed positive attitudes towards technology, pedagogical competence and readiness to use ICT in teaching. Some small areas of weakness were observed in self-efficacy for ICT integration. Similarly, the schools were found to be well led and collaborative in organizational culture and policies which fostered ICT integration. However, there were some weaknesses highlighted in the areas of infrastructure and access readiness. The findings also demonstrated a strong relationship between teacher readiness and institutional readiness, indicating that there is a need for a mutual match between the individual attributes and institutional support systems for successful integration of ICT. Based on the above findings, a Microlearning Package and Learning and Development Activity was developed as an intervention to solve the gaps identified. The package offers flexible and engaging learning materials with technology support that will enhance teachers' ICT competencies and confidence in using technology. The experience has led to the conclusion that while overall ICT readiness levels are good, ongoing professional development, ongoing institutional support and contextualized learning interventions are still necessary to further strengthen the integration and use of ICT and effective technology-supported teaching and learning.

Introduction

The study highlights the integration of ICT in 21st century learning and the difficulties of schools, especially in rural and developing countries, to effectively incorporate ICT in learning and teaching. While ICT contributes to improved teaching effectiveness, student engagement and digital literacy, there are still many teachers and institutions that lack the necessary skills and knowledge to use it to the best of their ability (Voogt & Knezek, 2018). Successful integration of ICTs also depends on teacher competence and institutional readiness to integrate ICTs, which entails leadership, policy and resource support (UNESCO, 2018).

Teacher readiness encompasses technological knowledge and digital skills, pedagogical ICT integration competence, attitudes and beliefs toward ICT, access to ICT resources and infrastructure, institutional support and professional development, self-efficacy and ICT integration. The main requirements for institutional readiness are infrastructure and access readiness, human capacity and competency readiness, leadership and governance readiness, curriculum and pedagogical integration readiness, technical support and system readiness, organizational culture and change readiness. Research showed that administrative support, school culture and the availability of technology are institutional factors that affect teachers' willingness for the integration of ICT (Tondeur et al., 2017; Avidov-Ungar, 2018). Even though the government has implemented various initiatives and digital literacy programs, schools still have insufficient infrastructure,

poor internet connectivity, and training level, and have inconsistencies in policy implementation (Miftah, 2022; Anh et al., 2023).

The DepEd Computerization Program and Digital Rise Program are programs being implemented in the Philippines to enhance ICT integration in schools (DepEd, 2020). Despite this, however, Filipino teachers continue to face issues on limited training, inadequate technical support and insufficient administrative help (Callo & Yazon 2020). Access to digital equipment, internet and regular professional development is limited especially in rural areas such as the Bambang II District.

The study aimed at assessing the readiness of the teachers and institutions in Bambang II District in the context of identifying the strengths and weaknesses of ICT integration in learning. The results were used to design instructional interventions for improving digital pedagogy and the use of digital technology for learning.

Research Questions

This study sought to answer the following questions:
1. What is the level of readiness for ICT integration in teaching among teachers of Bambang II District in terms of technological knowledge and digital skills, pedagogical ICT integration competence, attitudes and beliefs toward ICT integration, access to ICT resources and infrastructure, institutional support and professional development and self-efficacy for ICT integration?
2. What is the respondents' assessment on the level of institutional readiness for ICT integration among the elementary schools in Bambang II District in terms of infrastructure and access readiness, human capacity and competency readiness, leadership and governance readiness, curriculum and pedagogical integration readiness, technical support and systems readiness, and organizational culture and change readiness?
3. Is there a *significant relationship* between the respondents' evaluation on the levels of teacher and institutional readiness for ICT integration?
4. Based on the findings of study hat instructional intervention were developed?

Null Hypothesis of the Study

There is no significant relationship between the respondents' evaluation on the levels of teachers and institutional readiness for ICT integration.

Theoretical / Conceptual Framework

Three theoretical frameworks were used as anchors in this study; they are UNESCO ICT Competency Framework for Teachers (2018), Technological Pedagogical Content Knowledge (TPACK) and Technology Acceptance Model (TAM). The overall picture of the integration of ICTs is explained by these frameworks from institutional, pedagogical and psychological points of view. The UNESCO ICT Competency Framework was the main institutional framework and it highlighted that, teachers need to be skilled in the use of ICT and that technology should be leveraged to encourage collaboration, creativity, and problem solving among students (UNESCO, 2018). It also emphasizes the role of leadership, infrastructure, policies and professional development in facilitating ICT integration. Peng et al. (2023), Mane et al. (2025), and Avidov-Ungar (2018) also found infrastructure, leadership support, and coherent institutional policies are significant factors that affect teachers' ICT engagement and sustainability of digital practices.
According to the TPACK framework of Mishra & Koehler (2006), effective integration of ICT is through the confluence of three knowledge types: technological knowledge, pedagogical knowledge, and content knowledge (Mishra & Koehler, 2006). The studies conducted by Mishra et al. (2025), Barth- Cohen et al. (2023) and Voogt & Knezek (2018) revealed that pedagogical ICT competence is more effective in teachers to provide meaningful, student-centered and interactive learning experiences.
Davis (1989) developed the Technology Acceptance Model (TAM) that centered on teachers' attitudes and beliefs regarding the use of technology. It highlights perceived usefulness and perceived ease of use as two of the major factors that influence ICT uptake. Research by Scherer et al. (2019) and Baticulon et al. (2021) indicated that teachers' self-efficacy, confidence and positive attitudes played a significant role in the actual use of ICTs, and sometimes more than their technical ability did.
The study integrated these theories in the form of Input-Process-Output (IPO) model to evaluate the readiness of the teachers and institutions in the Bambang II District and to create an instructional intervention in the context of the district. This intervention was based on a microlearning package and Learning and Development (L&D) activities to build teachers' ICT capabilities, confidence, and ability to integrate it into their instruction. The intervention was built on Bandura (1997) self-efficacy theory and based on the results of Akram et al. (2022), Scherer et al. (2019), and was designed to deliver on-going, practical and sustainable support for the effective integration of ICTs.

Methodology

The study was descriptive-correlational research with quantitative approaches to explore the teacher and institutional readiness in implementing ICT in learning. Quantitative research was suitable as it allowed the objective and statistical analysis, identification of trends, establishment of relationships and collection of measurable data. The descriptive part was used to evaluate teachers and institutions' state of readiness without manipulating variables. Meanwhile, the correlational aspect found that there was a significant relationship between teacher readiness and institutional readiness on the integration of ICT. In this design, the researcher was able to find out if there was any relationship between the teacher's readiness to use ICT and the institutional support from the schools. In general, the quantitative, descriptive, and correlational methods enhanced the objectivity, reliability, and generalizability of the findings, and gave a secure ground for the recommendations and interventions to enhance the practices of integrating ICTs.

Research Environment

The study took place in Bambang II District of the Department of Education Schools Division of Nueva Vizcaya, Bambang, Region II (Cagayan Valley) Philippines. It has 14 public elementary schools in the rural areas of the district that have different levels of ICT resources, infrastructure, and teacher technological skills. Despite the implementation of ICT-related projects in the district including the DepEd Computerization Program, DepEd Commons, and digital literacy training, there are still disparities in teacher readiness and institutional support to integrate ICTs in the schools. The setting was suitable for the study as it offered a realistic setting for the evaluation of the teacher readiness and institutional readiness and development of the Microlearning Package for enhancing the integration of ICT.

Respondents

Frequency Distribution of Respondents by School and Sample

School	Number of respondents during the SY 2025-2026		
	Total	Sample	Percentage (%)
Abian Elementary School	7	5	4.9
Abinganan Elementary School	8	6	5.6
Almaguer North Elementary School	15	11	10.56
Almaguer South Elementary School	7	5	4.93
Bambang North Central School	30	22	21.14
Bambang East Elementary School	14	10	9.86
Dullao Elementary School	7	5	4.93
Labni Elementary School	8	6	5.63
Mabuslo Elementary School	7	5	4.93
Macate Elementary School	7	5	4.93
San Antonio North Elementary School	7	5	4.93
San Antonio South Elementary School	8	6	5.63
Sto. Niño Primary School	3	2	2.11
San Fernando Integrated School	14	10	9.86
Total	**142**	**104**	**100%**

Table 1 Frequency Distribution of the Respondents According to School and Sample Sampling Procedure

Sampling technique in this study was stratified proportionate sampling technique which consisted of a specific and proportional number of teaching staff in the Bambang II District. It was almost 73 per cent of the total teaching population that was sampled and formed. If the population is not homogeneous, or there are subgroups, stratification is required to ensure sampling bias and to ensure that the unique characteristics of the strata such as age, grade level, years of experience or specializations in a particular subject are adequately represented (Creswell & Creswell, 2018).

Research Instrument

In the study, the researcher-made structured questionnaires were the main instruments for data collection, which measured teacher and institutional readiness for ICT integration. Part I collected the demographic profile of the 104 teachers; Part II assessed the teacher readiness based on the Technology Acceptance Model (TAM) and TPACK frameworks and the related variables: technological knowledge and digital skills, pedagogical ICT integration competence, attitudes and

beliefs toward ICT integration, access to ICT resources and infrastructure, institutional support and professional development, and self-efficacy for ICT integration; Part III was the assessment of the institutional readiness, anchored on the UNESCO ICT Competency Framework (2018), and the related variables: infrastructure and access readiness, human capacity and competency readiness, leadership and governance readiness, curriculum and pedagogical integration readiness, technical support and system readiness, and organizational culture and change readiness. Items were rated on a 5-point Likert Scale of from 5 (Strongly Agree) to 1 (Strongly Disagree) with most being rated using this scale.

Data Gathering Procedure

The data collection process was done by following an orderly way of recurring validity, reliability and ethical compliance assayer of teacher readiness as well as institutional readiness for ICT Integration at Bambang II District. The research tool was initially validated by the experts and pilot- tested in one of the nearby schools to ensure reliability using primer analysis where Cronbach's Alpha was employed for calculating internal consistency of each of the constructs, with item–item correlations below 0.70 modified before final use. The questionnaire was sent to respondents only upon receiving the approval of the Department of Education Schools Division Superintendent of Nueva Vizcaya and individual written permission from respective heads of school, with informed consent in respect to such participation (and confidentiality concerns) being given at no cost.

Statistical Treatment of Data

Data gathered from the survey questionnaire were arranged, tabulated, and statistically analyzed to solve the issues presented by the study. The use of descriptive and inferential statistics was done to make sense of the data. Mean and standard deviation were utilized to measure the extent of the readiness of teachers and institutions regarding ICT integration using Likert-type scales. Meanwhile, the relationship between the readiness of the teachers and institutions for ICT integration was assessed through Spearman's rho, wherein the correlation obtained was tested for its significance at 0.05 alpha level.

Results and Discussion

Problem 1. Respondents' Level of Readiness for ICT Integration in Teaching

Teacher Readiness for ICT integration Dimensions	Mean	Std Deviation	Qualitative Description
Technological Knowledge and Digital Skills	4.12	0.61	High
Pedagogical ICT Integration Competence	4.25	0.60	High
Attitudes and Beliefs toward ICT Integration	4.38	0.59	High
Access to ICT Resources and Infrastructure	4.13	0.55	High
Institutional Support and Professional Development	4.17	0.54	High
Self-Efficacy for ICT Integration	4.11	0.60	High
Overall Mean	**4.19**	**0.52**	**High**

Table 2. Mean and Standard Deviation of the Respondents' Level of Readiness for ICT Integration in Teaching

The data in Table 2 present the level of teacher readiness for ICT integration in Bambang II District across six key dimensions. The overall mean score of 4.19, described as high, indicates that teachers in the district are generally well prepared to incorporate ICT into their instructional practices. All six dimensions received high ratings, suggesting a balanced level of readiness in terms of technical skills, pedagogical competence, attitudes, and institutional conditions. Among the indicators, attitudes and beliefs toward ICT integration obtained the highest mean of 4.38, while self-efficacy for ICT integration registered the lowest mean of 4.11, although it still fell within the high readiness category. The relatively small standard deviations across all dimensions indicate that responses were fairly consistent among the teachers, showing a shared perception of readiness across the district.

Problem 2. Institutional Level of Readiness for ICT Integration in Teaching

Institutional Readiness for ICT integration Dimensions	Mean	Std Deviation	Qualitative Description
Infrastructure and Access Readiness	3.86	0.71	High
Human Capacity and Competency Readiness	4.03	0.67	High
Leadership and Governance Readiness	4.15	0.71	High

Curriculum and Pedagogical Integration Readiness	4.14	0.68	High
Technical Support and Systems Readiness	3.95	0.74	High
Organizational Culture and Change Readiness	4.15	0.73	High
Mean	**4.05**	**0.64**	**High**

Table 3. Mean & Standard Deviation of the Institutional Level of Readiness for ICT Integration in Teaching

Table 3 reveal that the overall institutional readiness for ICT integration among elementary schools in Bambang II District is high, with a composite mean of 4.05 and a relatively low standard deviation of 0.64. This indicates that respondents generally perceive their schools as well-prepared to support ICT integration, with consistent responses across the different dimensions. Among the six indicators, leadership and governance readiness and organizational culture and change readiness obtained the highest mean scores of 4.15, suggesting that school leadership and the overall institutional mindset strongly support digital transformation. These are closely followed by curriculum and pedagogical integration readiness at 4.14 and human capacity and competency readiness at 4.03, both reflecting that teacher are equipped with the necessary skills and are capable of embedding ICT into teaching practices. On the other hand, technical support and systems readiness (3.95) and infrastructure and access readiness (3.86) received comparatively lower, though still high, ratings, indicating that while resources and systems are available, they may not be as robust or fully optimized as the human and leadership aspects.

Problem 3. Significant relationship between the Respondents' Evaluation on the Levels of Teacher and Institutional Readiness for ICT Integration

Variables Correlated	Spearman's rho	p-value	Remarks
Teacher and institutional readiness for ICT integration	0.749	<.001	Significant

Table 4. Analysis of Significant relationship between the Respondents' Evaluation on the Levels of Teacher and Institutional Readiness for ICT Integration

Table 4 reveal a strong and statistically significant relationship between teacher readiness and institutional readiness for ICT integration. The computed Spearman's rho value of 0.749 indicates a high positive correlation, suggesting that as the level of teacher readiness increases, the level of institutional readiness also tends to increase. The p-value <.001 is far below the standard significance level of 0.05, which leads to the rejection of the null hypothesis. This means that the observed relationship is not due to chance, but reflects a meaningful association between the two variables. The findings show a consistent pattern where both dimensions of readiness move in the same direction, highlighting a strong alignment between individual and organizational preparedness for ICT integration.

Problem 4. Instructional intervention developed based from the findings

The results of the study, especially the comparatively poorer outcomes in the domains of ICT self-efficacy and infrastructure and access readiness, are highly rationale in the development of the Learning and Development (L&D) activity and microlearning package. Despite the fact that the overall readiness levels are high, these less-strong areas reveal certain gaps that can impede the successful and successful implementation of the ICT in instructional practices. Based on the theory of self-efficacy by Bandura (1997), the proposed intervention will empower teachers, by providing them with structured, scaffolded, and practice-based learning experiences, to increase their confidence and capability in using ICT. The microlearning package, including short, narrow, and available modules, is created to allow ongoing opportunities of mastery experiences, which will gradually enhance the competence and confidence of the teachers in their capacity to use technology effectively. The stated approach is justified by the fact that studies indicate that specific and continuous professional growth is a powerful way of enhancing the ICT self-efficacy and use of teachers (Scherer et al., 2019; Akram et al., 2022).

Conclusion and Recommendations

Based on the findings, the following conclusions were derived: (1) Teachers are well prepared to use ICT in their teaching as evidenced by high internal motivation and conducive external factors. The high levels of pedagogical competence and positive attitudes indicate that the developed interactive contextualized e-learning resources are likely to be effectively utilized and accepted in classroom practice. However, the slightly lower self-efficacy and technological skill levels suggest that continuous support and training are necessary to maximize the full potential of these resources. (2) The elementary

schools in Bambang II District are generally well-prepared to implement ICT integration, particularly due to strong leadership support, capable teachers, and a positive organizational culture. These findings affirm that while human and institutional factors are already conducive to effective technology use in teaching, improvements in infrastructure and technical support are necessary to fully achieve sustainable and efficient ICT integration. (3) Teacher readiness and Institutional readiness are strongly interdependent and need to be nurtured together to ensure effective integration of ICTs. The positive relationship is strong, this means that the success of the interactive contextualized e-learning resources developed relies not only on the competence of the teacher, but also on the presence of institutional conditions that support its success. Thus, the study establishes that the effectiveness and relevance of the e-learning resources are enhanced when both teachers and schools are adequately prepared and supported. (4) The proposed Microlearning Package on ICT Integration is an opportune and relevant intervention to instruction that can help in close the identified gaps. It offers adaptable, convenient and specific learning chances that can also boost the competencies of teachers and promote the ICT integration activities.

Recommendations

1.Teachers may engage in continuous professional development activities that focus on enhancing advanced digital skills and strengthening self-confidence in using ICT tools. Institutional support should be continued and strengthened by providing regular training, reliable infrastructure and technical assistance to school administrators to ensure the effective use e-learning resources. Future researchers may explore the long- term impact of these resources on student learning outcomes and investigate strategies to further improve teachers' self-efficacy and technological proficiency.
2.Investments in infrastructure and reinforce technical support systems may be made by school administrators to fill these gaps. Furthermore, future researchers may explore the long- term impact of ICT integration on student learning outcomes and examine specific interventions that can further optimize resource utilization and technology supported instruction in similar contexts.
3.Continuous capacity building activities can be undertaken by teachers to improve their technological skills and pedagogical approaches on e-learning resources' integration. Enhancing institutional support can be achieved through strengthening the ICT infrastructure, regular professional development and creating an innovation and collaboration culture in the school. Future researchers may explore the long- term impact of contextualized e-learning resources on student achievement and examine other factors such as learner readiness and community support to further enrich the implementation of ICT in education.
4.Department of Education (DepEd) Administrators may look into the option of implementing and promoting microlearning-based learning development to increase the level of ICT integration skills among the teachers and learners understanding. DepEd can also afford to invest more in updating ICT resources and policies that perpetuate technology integration in schools.
5.It is proposed to the schools to quality assure the Microlearning Package to ICT Integration and keep track of its efficacy and offer feedback to achieve constant enhancement. This will make the intervention sensitive to the needs of the teachers and ultimately helpful to the learners.
6.It is recommended that schools may adopt the developed microlearning module package to strengthen teachers' self-efficacy for ICT integration. Since the modules are designed to be short, focused, and flexible, they can be integrated into teachers' schedules without disrupting their workload. School administrators could facilitate regular use of these modules for continuous professional development so that teachers can gradually develop confidence and competence in the use of ICTs.
7.It is recommended that future researchers may conduct the study at each school to determine the problem and provide the right intervention.
8.It is advisable that future researchers may triangulate by conducting interviews with school heads and other stakeholders to determine their readiness in ICT.

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Competing Interests Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study; all data used were obtained from previously published sources as cited in the reference list.

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Appendices

No appendices are attached to this study.