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Information and Communication Technology Competence of Baby Boomer Teachers and their Pedagogical Performance

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Abstract

Aim: This study determined the relationship between baby boomer teachers' Information and Communication Technology (ICT) competencies and their pedagogical performance.

Methodology: A mixed-concurrent parallel design was used in the study. A descriptive research design was used for the quantitative part of the study which included assessment of the ICT competency of the baby boomer teachers using the National ICT Competency Standards for Teachers (NICS-T). The baby boomer teachers' pedagogical performance was also evaluated using the framework of Curriculum-Based Performance Appraisal System for Teacher (CB-PAST). Correlational design was used to determine if there exists a relationship between the level of ICT competencies of teachers and their level of pedagogical performance. A face-to-face interview with the participants was also conducted to identify the factors which affecting their level of ICT competency and their pedagogical performance. The data on the ICT competency and the pedagogical performance of the baby boomer teacher was analyzed using descriptive statistics. The relationship between these two variables was then determined using Spearman's Correlation. Scripts from the interview were scrutinized using framework analysis.

Result: Results showed that the Baby Boomer Teachers have basic ICT Competency Level while their pedagogical performance were assessed to be within Highly Proficient level. The ICT competency of the baby boomer teachers was proven to have significant relationship on their pedagogical performance. Several factors were also identified to have affected the ICT competency level of the baby boomer teachers which include negative attitude towards ICT, academic background, and lack of institutional support. A proposed training workshop was also crafted by the researcher to aid in the developmental needs of the baby boomer teachers particularly in improving their ICT competency.

Conclusion: Results indicate that baby boomer teachers exhibit basic ICT competency but demonstrate highly proficient pedagogical performance. There is a significant relationship between the ICT competence of baby boomer teachers and their pedagogical performance. Negative attitudes towards ICT, academic background, and the lack of institutional support are the most common theme that baby boomer has identified as the factors associated with their present ICT competency level and pedagogical performance. Based on the study's findings, a proposed series of training workshops was designed to enhance the teacher's ICT competency. This training workshop shall focus on developing the four domains specified in the NICS-Teacher.

Keywords: *ICT, Teachers, Pedagogy, Baby boomer*

INTRODUCTION

Information and Communication Technology has proven its worth in almost all areas of human life. Breakthroughs and innovations in every science have become constant news from every corner of the world (Tiquis, 2023). The development brought by the introduction of ICT to businesses, media, medicine, government, and education has reached a milestone incomparable to the most recent past.

In education, benefits of incorporating ICT in the teaching and learning processes have bear positive result to the performance and achievements of both the learners and the teachers. The variety of uses and functions of ICT devices has provided teachers with numerous interactive and interesting teaching ideas and methods. Other related

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tasks were also made easier with the aid of ICT (Lawrence & Tar, 2018). On the other hand, computer-based education was found to be successful in stimulating the learners' interest and increased their participation during class instructions (Lin et al., 2017). ICT has also been a reliable medium of instruction in the implementation of distance learning during the pandemic.

During the peak of the pandemic, the Department of Education (DepEd) has been obliged to cease face-to-face lessons throughout Luzon and has adopted the Basic Education Learning Continuity Plan (BE-LCP) for the school year 2020-2021. BE-LCP underlines that all students can benefit from blended distance learning modalities until the Department of Health (DOH), the Inter-Agency Task Force for the Management of Infectious Disease (IATF), or the President lifts or relaxes any limitation on face-to-face learning in schools/CLCs (DepEd Order No. 12, s. 2020). This has prompt educational institutions to depend on the benefits of ICT to ensure that their learners' instructional needs are delivered despite the restriction caused by the pandemic (Momanyi & Del Mundo, 2022).

Far from the usual learners-to-teacher-interaction during class discussion, the teaching and learning process during pandemic has compelled teachers to delve into a more technical task such as printing of learning materials, preparation of lesson presentations to be distributed in soft copies or streamed online. There is also the need for teachers to attend webinars and capacity building programs using different online platforms to acquire CPD Units as a part of the the mandate of the Continuing Professional Development (CPD) Act of 2016. However, with the existing restrictions for the conduct of the usual face to face seminars and workshops for teachers, any form of professional development will be done mostly online through synchronous or asynchronous sessions.

Other related task such as submitting school related paper works using e-mail or other file sharing application were also implemented as a part of limiting the possibilities of contracting the virus. All of this was done in the convenience of their home or independently at school while following the Alternative Working Arrangement as stipulated in the DepEd Order No. 11, s.2020. While this course of action proves to be effective in safeguarding the teachers and the learners against the dangers of the Covid 19 virus, this also has exposed the need for the educational sector to upgrade its ICT capabilities.

Even before the Covid 19 pandemic, some teachers are already having a hard time utilizing Information and Communication Technology (ICT) tool while doing school related works and even in teaching. This is particularly hard for the oldest working generation of today known as the "Baby Boomer Generation". Baby Boomer teachers are those who are in their late-career and whose age ranges from fifty-seven and above. They were those individuals who were born between 1945 and 1964, or from the time immediately after the end of World War II. In the field of education, individuals of this generation are the more experienced instructors of today (Polat et al., 2019).

At present, only few teachers from their generation remained, most of them have retired from the service and are enjoying their private life. Those who have remained were observed to struggle the rapid shift in education towards the use and integration of ICT in the different aspect of their profession. Some of them were having problems using computer for encoding documents, making slide presentation to be use for lesson or for presenting a topic for seminars, using spreadsheet which could be used for making grades or tabulating data, or even attending webinars and accomplishing post webinar assessment or evaluation online. This generation of teachers believes that ICT could expedite their work however without mastering the basic skill sets and competencies, using ICT is an additional burden that should not be experienced by any individual nearing their retirement. However, their teaching practices and strategies, though considered traditional, were still acknowledge for their effectivity in improving learners' academic performance. Drawn to classroom-based instruction, baby boomer teachers were known to employ lecture techniques supplemented by practical exercises like hands on activities and explicit method of instructions which have proven effective in learners' academic development (Yaakob et al., 2020). Thus, their inputs in improving the literacy and numeracy levels were highly solicited in designing intervention programs.

Despite their known resistance to change (Polat et al., 2019) and their indifference towards technology (Venter, 2017), it is still a must that this generation of teachers to be capacitated with ICT competencies and skills. Consequently, this will unlock more possibilities and options in delivering instructions to the learners as well as in assuming roles and responsibilities related to their professions. Their experiences and wisdom are also considered as a valuable asset which must be imparted to the younger generation of teachers. Their best practices and legacy should be perpetuated which could be done with the help of ICT. The modern technology has provided digital venues and media so that this knowledge and expertise be shared online to vast audience. Additionally, the same technology has been a continual source of educational references used for growing and increasing professional growth and development. ICT would allow this generation of teachers to connect with like-minded peers, or colleagues who have comparable interests, and educational philosophy (Prestridge, 2019). In general, this study would give light on the ICT competencies of baby boomers and its relationship to their pedagogical performance. Hopefully, the result of this study

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would be considered in crafting new programs or in the amendments on the existing policies of the educational institutions to better help their stakeholders.

Theoretical Framework

The theoretical framework that is the underpinning of this study is the Connectivism Theory. The theory of connectivism was initially proposed by George Siemens and Stephen Downes in 2005. According to this theory, an individual's competency can be raised if they are shown how to use technology to navigate, build, and utilize social networks for their learning.

The foundation of connectivism leans on the notion that social interaction and new educational opportunities are fostered by technology. It acknowledges that technology plays a significant role in the learning process and that staying connected always allows us to make decisions about our learning. Additionally, it encourages group participation and conversation, allowing for various points of view and perspectives when it comes to making decisions, solving problems, and understanding information. This was provided to teachers through mentoring, attending workshops and seminars and other capacity-building programs.

Despite being one of the more recent learning theories, connectivism is already changing the trends for professional development. Connectivism offers a paradigm for learning and development to rethink current procedures and training as today's workforce relies more on technology to accomplish tasks. Connectivism encourages learning in environments other than a person, such as social media, online communities, blogs, or knowledge databases.

Connectivism theory is considered the most relevant to the current study since it is regarded as an e-learning theory (Siemens,2005). Furthermore, this theory also explores using digital technology to enhance the educational process (Alzain, 2019), to make teaching and learning more vivid, accessible, and cost-effective (Owo & Udoka, 2021). Siemens (2004) also adds that connectivism "has implications for all aspects of life," including management and leadership, the media sector, and organizational knowledge management (Corbett & Spinello, 2020), which is also the tenet of the National ICT Competency Standards for Teachers.

Connectivism lays more emphasis on the connected and distributed learning experiences of individuals, in contrast to other learning theories that place more emphasis on the independent learning experiences of individual learners. In learning communities, knowledge is viewed as a shared activity (Jung, 2019), practically how teachers develop their ICT competency. Their ICT competency level is a product of their exposure to the different providers of such competency which includes their colleagues, seminars or even non-human sources such as the Internet.

According to the connectivist viewpoint, knowledge is limitless, and the best way to take advantage of this knowledge is to access and use information as needed rather than memorize or comprehend everything (Boyraz & Ocak, 2021). According to Siemens (2005), a significant portion of cognitive functions and problem-solving should be left to machines because "learning can also occur in non-human beings." Hence, teachers must be equipped with the necessary ICT tools and equipment not only to provide them with the skills and competency but also to expand their knowledge.

Conceptual Framework

The following paradigm shows the process by which this research was conceptualized. Figure 1 shows how the ICT competency of baby boomer teachers affects their pedagogical performance.

ICT competency is using electronic media for work, leisure, and communication confidently and objectively. These skills relate to logical and critical thinking, advanced information management, and strong communication abilities. The National ICT Competency Standards for Teachers (NICS-T) evaluate a teacher's ICT proficiency level. NICS-T evaluates the teachers' competency in its four domains: Technological Operation and Concepts, Social and Ethics, Pedagogical, and Professional.

Figure 1 shows the connection of ICT competency to the other variable of the study. Developing the ICT competency of the teacher may help improve the teacher's pedagogical performance. However, the development of the ICT competency depends on how the teacher develops the four domains of the ICT competency.

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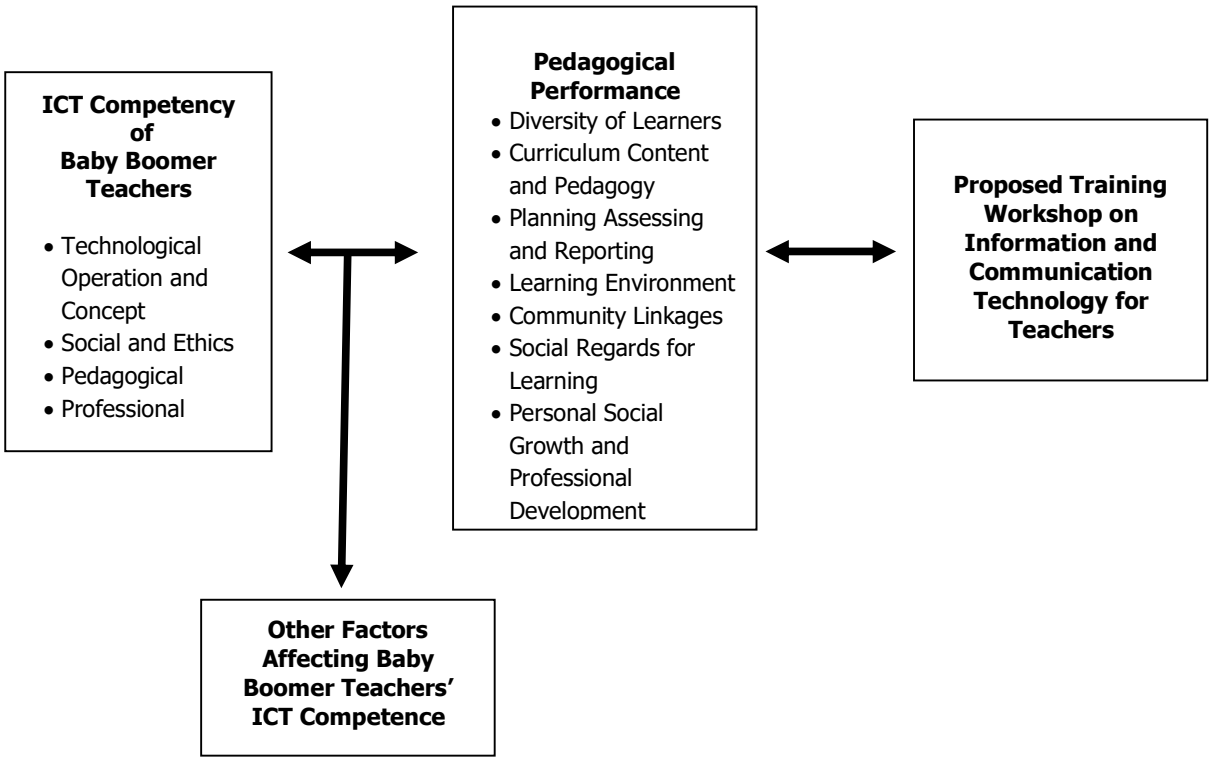

Figure 1. Conceptual Paradigm

Technological operation and concepts enumerate the standards that encompass knowledge of, proficiency with, and productivity in using various ICT tools, including computers, other communication tools, and applications that may be used offline or online.

The social and ethical domain covers knowledge of social, ethical, legal, and human issues and community connections. This covers the legal implications of accessing digital information and the appropriate behavior in communicating using ICT tools and the proper handling of it.

The pedagogical domain includes skills related to using technology in the planning, designing, implementing, facilitating, and monitoring teaching and learning methods that incorporate various information and communication technologies to promote and enhance student learning. It also includes skills related to assessing and evaluating student learning and performance.

The professional domain pertains to the knowledge of how ICT should be used for research, innovation, collaboration, and professional growth and development.

Pedagogical performance refers to how teachers present their lessons and instructions to learners. The pedagogical performance of the teacher will be assessed according to the pedagogical standards specified by the National Competency-Based Teacher Standard, which was the basis of the Competency-Based Performance Appraisal System Tool (CB-PAST). This tool explores the teacher's pedagogical performance according to the following domains: diversity of learners, curriculum content and pedagogy, planning, assessing, reporting, learning environment, community linkages, social regard for learning, and personal and social growth and professional development.

Diversity of learners focuses on the principle that teachers can support learning even with diverse students by recognizing and respecting individual differences and using knowledge of those characteristics to construct a variety of learning activities to ensure that all students can reach the intended learning objectives.

Curriculum content and pedagogy refer to all elements of the teaching-learning process that cooperate to help students grasp the course objectives and goals and meet the demanding learning standards outlined in the curriculum.

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These variables include the teacher's subject expertise and understanding of the learning process, teaching-learning strategies and activities, educational resources, and instructional materials.

Planning, assessing and reporting related to the coordination of the assessment and planning processes. This area focuses on using assessment data to design and amend teaching-learning plans, incorporating assessment methods into the planning and execution of teaching-learning activities, and reporting on the actual achievement and behavior of the learners.

Learning environment emphasizes the value of creating a social, psychological, and physical environment where all students, regardless of their unique learning styles, can participate in various learning activities and strive to meet high levels of learning.

Community linkages refer to the belief that lessons should be directly related to the experiences and goals of students outside of the classroom. As a result, this area focuses on the efforts made by teachers to improve the connections between communities and schools to aid in the achievement of curriculum objectives.

Social regard for learning focuses on the premise that teachers act as inspiring and effective role models of the worth of making various learning endeavors. This ideal is demonstrated by the teacher's acts, words, and other social interactions with the students.

Personal, social growth and professional development highlight that teachers should hold high regard for the teaching profession, be concerned about their professional growth, and constantly strive to become better teachers.

Other factors affecting the baby boomer teachers' ICT competency refer to the internal or external components that teachers believed affected their acceptance and utilization of ICT. Themes were derived from the transcripts collected through the face-to-face interview and were analyzed using the framework analysis.

The proposed training and workshop in ICT for teachers is a professional development plan designed to capacitate teachers with knowledge and skills related to Information and Communication Technology. The training workshop will center on developing the skill and competencies stipulated in the National ICT Competency Standards for Teachers.

Objectives

This research determined the relationship between the Information and Communication Technology (ICT) competencies of Baby Boomer Teachers of Ocampo District and their pedagogical performance.

Specifically, the study answered the following questions:

5. What is the level of ICT competencies of baby boomer teachers according to the following domain:
    a. Technological Operation and Concept,
    b. Social and Ethics,
    c. Pedagogical, and
    d. Professional.
6. What is the level of pedagogical performance of baby boomer teachers in based on the seven domains:
    a. diversity of learners,
    b. curriculum content and pedagogy,
    c. planning, assessing and reporting,
    d. learning environment,
    e. community linkages,
    f. social regard for learning, and
    g. personal, social growth and professional development?
7. Is there a relationship between ICT competencies and pedagogical performance?
8. What other factors are associated with the Baby Boomers' ICT competency and pedagogical performance?
9. What training workshop may be proposed based on the result of the study?

METHODS

Research Design

A mixed-concurrent parallel design was used to determine the ICT competency of Baby boomer teachers and its relationship to their pedagogical performance. A descriptive research design was used for the quantitative part of the study, which included an assessment of the ICT competency of the baby boomer teachers using the assessment tool adopted from the National ICT Competency Standards for Teachers (NICS-T) as well as the assessment of the level of pedagogical performance of the baby boomer teachers which was evaluated using the framework of Curriculum-

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Based Performance Appraisal System for Teacher (CB-PAST). Correlational design was also used to determine if there exists a relationship between the level of ICT competencies of teachers and their level of pedagogical performance. Qualitative data was drawn using a one-on-one interview method using a semi-structured interview form. The gathered data was then analyzed using framework analysis to synthesize the most common theme.

Respondent of the Study

The participants of the study were those 23 teachers who were born between 1946 to 1964. Since there are only a few identified teachers who are within the baby boomer generation, every identified baby boomer teacher was considered as participant via convenience sampling. These teachers are currently stationed in the Public Elementary School District of Ocampo, Camarines Sur. Of the twenty elementary schools of Ocampo District only eleven schools have teachers whose age range from fifty-four to sixty-five. Of the 23, sixteen have allowed being interviewed face to face while the rest opted to answer the guide question in the essay. Those who were interviewed were also selected for the qualitative part of this study.

Data Gathering Instrument

The researcher used a survey questionnaire consisting of two parts. The first part sought the ICT competency level of baby boomer teachers using the NICS-Teacher framework. This framework is the product of the collaboration of the Commission on Information and Communications Technology's Human Capital Development Group and the Department of Education in their aim to create national information and communications technology competency standards for teachers.

Data Gathering Procedure

The researcher, proceeded to the Elementary District Supervisor of Ocampo District to ask for consent to conduct the study. Another request letter was also given to the school heads of the identified participants of the study asking permission to conduct a face-to-face interview with the participant. Informed consent was given to the respondents and was told about the purpose of their participation, as well as assurances that their responses would be kept completely confidential.

A self-assessment tool was provided to the respondent to measure their ICT competency. The self-assessment research tool was based on the framework of National ICT Competency Standards for Teachers and the Curriculum-Based Performance Appraisal System for Teachers or CB-PAST.

For the qualitative part of the study, an interview with the respondent was conducted with the utmost assurance of following the health protocols. However, due to the strict personal health protocols and work arrangements that some of the participants follow, some of them opt to answer the guide questions in the essay. This also made the retrieval of the accomplished research instrument difficult for the researcher. Consent to take transcript recordings from those who agreed to face-to-face interviews was secured from the respondent. The researcher ensured that during the conduct of the study, strict compliance with health protocols was followed.

Data Analysis

The data collected from the questionnaire was analyzed quantitatively using IBM- SPSS Statistics. Descriptive statistics were utilized to quantify the competency level of baby boomer teachers in ICT. The mean for each standard of the seven domains was computed and interpreted using the Likert scale.

To obtain the pertinent data as to the baby boomer teachers' pedagogical performance, descriptive statistics were also used. The computed mean for each standard was then interpreted using verbal interpretation. Meanwhile, Spearman's Rank Correlation Coefficient was employed since it is the most appropriate statistical tool for data that is quantified or given in ordinal scales and includes the entire population as respondents.

Transcripts from the interview were subjected to framework analysis.

The researcher combined the important insights from the prior processes, including hunches about patterns to examine in the data, with comparisons between and within units of analysis as well as across and within framework components in the final step of framework analysis, called mapping and interpretation. Variances were examined throughout the entire dataset, within subgroups and subthemes, and searching for data clusters are comparisons that may be of interest at this stage. The study's topic, the data, and key patterns are evaluated, consolidated, collapsed, or condensed as appropriate for the charts and other data.

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Support for the main theme statement in verbatim was also incorporated in the presentation of themes as well as the recent studies which contradict and support the identified theme in relation to the factors associated with the baby boomer teacher's ICT competency and pedagogical performance.

Ethical Consideration

This study upholds and protects the sanctity of research ethics. Therefore, all necessary measures to protect the participants' identities, as well as the rules governing confidentiality, integrity, and objectivity, were scrupulously followed throughout the research process.

Informed consent was given to each participant before the conduct of the study. This document contains the purpose of the study as well as the parameters of why the participant was chosen to take part in the study. The participant was then informed through informed consent on the risk and discomfort as well as the benefits of being a participant in this study. The participant was also ensured of the confidentiality of their data and their freedom to withdraw in case they opt to do so.

The researchers also ensured that proper health protocol was followed ing the conduct of the study, especially upon entering the premises of the participants' school.

RESULT AND DISCUSSION

Table 1 shows the result of the assessment on participants' ICT competence using the NICS-Teachers framework.

DOMAINS	Mean	VI
PROFESSIONAL	2.24	Basic
PEDAGOGICAL	2.48	Basic
TECHNOLOGICAL OPERATIONS AND CONCEPTS	2.54	Basic
SOCIAL AND ETHICAL	2.86	Intermediate
Overall Mean	2.53	Basic

Legend: 1.00-1.80 fundamental, 1.81-2.60 basic, 2.61-3.40 intermediate, 3.41-4.20 advance, 4.21-5.00 proficient

The table shown that baby boomer teachers were found to have basic level of competency in most of the ICT competency domain. Professional domain having the lowest mean of 2.24, followed by Pedagogical domain with 2.48 and Technological operation and concepts with 2.54. Only under the Social and Ethical domain, that the baby boomer teachers were revealed to have intermediate level of competence. This result highlights the need for the baby boomer teachers to be capacitated with ICT training. Improving their ICT competence may help them in accomplishing administrative work, but most importantly their teaching practices. Incorporating technology into education does not only promise great advantages to the student learning performance and achievement, but it also acquaints theme with relevant skills that a 21st century learner must possess. This corroborates the result from other studies such as those of Fang et al. (2018), Polat et al. (2019), Artacho et al. (2020), Kodrat (2020) and Rodriguez et al (2021) which reveals that teachers within this age bracket have low technological competence. The lack of interest from the baby boomer teachers to embark in learning ICT as well as the limited capacity building program in this area was found out to be the cause of the low competency level of baby boomer teachers in Information and Communication Technology.

DOMAINS	Mean	VI
Planning, Assessing and Reporting	3.24	Proficient
Curriculum Content and Pedagogy	3.25	Proficient
Learning Environment	3.25	Proficient
Diversity of learners	3.31	Highly Proficient
Personal, Social growth and Professional Development	3.31	Highly Proficient
Community Linkages	3.38	Highly Proficient
Social Regard for Learning	3.44	Highly Proficient
Total	**3.31**	**Highly proficient**

Legend: 1.00-1.75 below basic, 1.76-2.50 basic, 2.11-3.25 proficient, 3.26-4.00 highly proficient

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The table shows that the baby boomer teacher has the lowest mean on Planning, Assessing and Reporting with 3.24 mean. It could be inferred from this result that although this domain got the lowest mean among the other pedagogical performance domain, the verbal interpretation of Proficient still proves that baby boomer teachers can work independently in activities related to this domain such as crafting of assessment materials and tools as well as in providing feedback to the learners as well as to their parents.

With 3.44 mean, Social Regards for Learning were found to be the specialty of the baby boomer teachers. This could mean that baby boomer teachers see themselves as a strong and positive role model of the values which are exemplified by their actions, remarks, and various forms of social interactions with students. This backs the study of Romanes and Veniegas (2018) which shows that baby boomer teachers are excellent at bringing 21st-century abilities into the classroom because they have the knowledge and experience necessary to handle any changes brought on by the demands of the 21st century.

Variable	Spearman Correlation	p-value	Interpretation
Curriculum Content and Pedagogy	.714	.000	Highly Significant
Personal, Social Growth and Professional Development	.525	.017	Significant
Learning Environment	.513	.021	Significant
Diversity of Learners	.437	.054	Not Significant
Community Linkages	.431	.058	Not Significant
Planning, Assessing and Reporting	.412	.071	Not Significant
Social Regard for Learning	.359	.120	Not Significant
Pedagogical Performance	**.536**	**.015**	**Significant**

Legend: $p \leq 0.001$ very highly significant, $p \leq 0.01$ highly significant, $p \leq 0.05$ significant, $p > 0.05$ not significant

A Spearman Rank Correlation Coefficient was computed to assess the relationship between the ICT competency of baby boomer teachers to each domain of the National Competency-Based Standards for Teachers. The results revealed that Curriculum Content and Pedagogy (p=.000) have a highly significant relationship towards the ICT Competency of the baby boomer teacher. It could be gleaned from this data that baby boomer teachers could greatly improve the teaching and learning processes if they focused on developing their ICT competence. Although they were known to prefer conventional methods of teaching, introducing ICT into their lessons can further help learners understand the course objectives and goals much better. Teachers must be assisted in understanding how educational technology can inform and enrich pedagogy, thus contributing to improved student achievement and their teaching methods and approaches. In the study of Vyalikova et al. (2019), knowing and utilizing the most recent advances in the theory and practice of current ICT tools in education can improve the learning process's efficiency.

Personal, Social Growth and Professional Development (p=.017) were also found to have a significant relationship to the ICT competency of the baby boomer teachers. This may suggest that capacity-building programs for teachers can be greatly improved if incorporated with ICT or focused on ICT development.

In the study of Ahmed et al. (2019), it was revealed that ICT had been shown to assist teachers in their professional growth. ICT was found to improve instruction delivery, evaluation and assessment methods for efficient teaching and learning processes, and teacher professional growth. They concluded that ICT and teacher professional development go hand in hand. Thus, it enhances the professional growth of the teachers.

With (p=.021), learning environments were also found to have a significant relationship with the ICT competency of the baby boomer teachers. This result implies that improving the ICT competency of the teacher will improve the learning environment. In the study conducted by Nortvig et al. (2018), it was found that to create teaching methods that promote dynamic, engaging, and collaborative learning environments, it is crucial to involve teachers in the development of their technological literacy. This enabled the teacher to acquire the knowledge and self-assurance needed to launch more independent research into technologies to assist their teaching objectives.

Baby boomers have identified several factors to have affected their ICT competence. Some of the common themes which were identified during the face-to-face interview was negative attitude towards ICT, academic background, and the lack of institutional support.

Negative attitude towards ICT is considered a barrier that influences the ICT acceptance of baby boomer teachers. The findings from the study of Circenis and Erts (2018), Di Giacomo et al. (2020), and Faloye et al. (2022)

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reveal that low digital skills are not associated with age. They further explain that the baby boomers' computer anxiety is correlated with one's impression of one's technological comfort level. This comfort level, however, can be associated with a negative attitude towards the use of ICT. To get the desired educational result, one must have an optimistic outlook. The positive views of teachers on the adoption of online education will encourage students to study, as teachers play crucial roles in pushing students to learn (Petalla, 2022).

With very little knowledge of the fundamentals of ICT, baby boomer teachers claim that with the new modality of learning they have no other choice but to be ready to use ICT despite their deficiency. Earlier studies in ICT such as those of Haydn (2008) and Jadhav (2011), have revealed that ICT-based teaching and learning are mostly ignored in pre-service teacher preparation curricula. It is evident from their study that education even long after the baby boomer teachers leave their tertiary levels has not given much thought to training student instructors for ICT-based teaching and learning.

Institutional support was also considered by other research to be a barrier to upgrading the teacher's ICT competence. In the study of Muslem et al. (2018), they suggested that if the school wants to offer ICT to the teachers, then every teacher should have access to it. It would be difficult to use the facility efficiently if only one or two teachers had access to it because each teacher would have to wait for their turn or share. Since not all teachers can afford ICT equipment for their own classes in schools, it would be a major issue.

The findings indicate that baby boomer teachers possess a foundational level of competence in accordance with the criteria outlined by NCIS-Teachers standards. In response to these results, the researcher has formulated a training proposal aimed at enhancing teachers' proficiency in the primary domains of ICT competency, specifically focusing on Technological Operation and Concept, Social and Ethics, Pedagogical, and Professional aspects. Below is the proposed training workshop based on the result of the study.

PROJECT PROPOSAL

I. Basic Information

Title:	**Training Workshop on Information and Communication Technology for Baby Boomer Teachers**
Proponent:	Jay-ar Barena Sabordo
Beneficiaries:	Teachers and School Heads of Ocampo District
Duration:	Yearwide

II. Rationale:

Information and Communication Technology (ICT) has long been proven to be a reliable factor in ensuring the efficient delivery of lessons to students as well as in accomplishing other related works for teachers. Its integration into the teaching and learning process is a remarkable innovation that has resulted in improving the students' performance, increased retention, and triggered participation among students.

ICT also promises ease in accomplishing another work-related task for teachers. Lesson presentation, record keeping, record making, and computation have never been as easy as it is now with the aid of ICT. ICT has also been instrumental in developing teachers professionally, adding to the skill and competence necessary for the 20th-century teachers. However, without the proper ICT knowledge and skills the mentioned advantages and benefits of ICT will be a missed opportunity for teachers.

The result from the research focusing on the Information and Communication Technology competence of the baby boomer teacher has shown that baby boomer teachers are identified to have only basic competency in ICT. Furthermore, the same research has shown that improving the ICT competence of the teacher has a significant relationship to their pedagogical performance. Hence, the conception and implementation of training workshops on ICT would benefit not only the teachers but also the learners as well.

It is through this background that this training was conceptualized.

III. General Objective:

This proposed project is aimed at improving teachers' competence in Information and Communication Technology. Through this training workshop the teachers will be able to:

1. build their skill and knowledge on basic operation and concept of ICT,
2. develop teaching skills that integrate ICT applications to broaden pedagogical practice,

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3. acquaints the teachers with the proper ethics and safety standards in using ICT,
4. capacitate teachers with the competency regarding the use of ICT tools available offline and online, and
5. update teachers with the new trends in the teaching and learning process and professional development.

IV. Work Plan on the Conduct of Training Workshop on Information and Communication Technology for Teachers

Activities	Time Frame	Resource Requirement	Person Involve	Target Outputs
A. Pre Implementation				
1. Request a meeting with the School Head and the faculty regarding the proposed project of conducting a Seminar Workshop on ICT for Teacher	August 2023	P 500.00	Teachers and School Head	Narrative Report
2. Drafting of Project Proposal			Proponent	Approved ProjectProposal
3. Assess the teachers' ICT Competency using the NICS-Teacher				Assessment Result
4. Create a Technical Group to facilitate the series of Workshop				List of Committee
B. Actual Implementation				
1. Conduct the series of workshops every grading period according to the domains of NCIS-Teachers: • First Quarter: -*Technological Concept and Operation* • Second Quarter *-Social and Ethical*	August-October 2023	P 5000.00	Teachers and School Head	Narrative Report

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• Third Quarter *-Pedagogical* • Fourth Quarter *-Professional*	November-January 2024 February - April 2024 May-July 2024			
2. Monitor the Teachers' Training	August 2023 -July 2024		Project Proponent	Submitted Outputs of the Participant
C. POST-IMPLEMENTATION				
3. Prepare Picto-Narrative Report on the conduct of the Series of Training Workshop	Every quarter after the conduct of the seminar	150.00	Project Proponent/Committee Chairman	Submitted Picto-Narrative report for each quarter
4. Conduct Post Assessment on Teacher ICT Competency	July 2024	500.00	Project Proponent/Committee Chairman	Summary of the ICT Assessment of Teachers
5. Relay the Result of the training seminars to the stake holder	July 2024	100.00	Project Proponent	Narrative Report
6. Monitoring on the adoptions of strategies and methods acquired during the series of seminar workshop	S/Y 2024-2025	1000.00	Project Proponent	Teachers' pedagogical Performance and Utilization of ICT

V. **Training Matrix**

a. First Quarter

Technological Operations and Concepts

TIME	ACTIVITIES		
	DAY 1	**DAY 2**	**DAY 3**
7:00-7:30	Arrival and Registration	Arrival and Registration	Arrival and Registration
7:31-8:00	Opening Program and Training Overview	Recap	Recap
8:01-9:30	**Introduction to ICT** • *Basic Computer Part and Function* • *File Management*	Basic Microsoft Excel	Accomplishing School Form Using Microsoft Excel

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9:31-9:50	BREAK		
9:51-10:20	Basic Microsoft Word	Workshop	Workshop
10:21-11:20	Workshop	Presentation of Output	Lesson Plan Making Using Microsoft Word
11:21-12:00	Presentation of Output	Reflection	Workshop
12:01-1:00	LUNCH BREAK		
1:01-2:30	Basic Microsoft PowerPoint	**Introduction to Internet** • Proper Netequette • Downloading and Uploading of Files • Safe Use of Internet	Making PowerPoint Presentation of Lesson
2:31-3:20	Workshop	Workshop	Demonstration Teaching
3:21- 4:00	Presentation of Output	Presentation of Output	
4:00-4:30	Reflection	Reflection	Closing Ceremony

b. 2nd Quarter

Social and Ethical

TIME	ACTIVITIES		
	DAY 1	**DAY 2**	**DAY 3**
7:00-7:30	Arrival and Registration	Arrival and Registration	Arrival and Registration
7:31-8:00	Opening Program and Training Overview	Recap	Recap
8:01-9:30	Safe and sound technology supported learning environment	Overview: Legal practices in the use of technology	Intro to Plagiarism: "Giving Credit where credit is due"
9:31-10:00	BREAK		
10:01-11:00	Respect for privacy and cyber etiquette, phone etiquette and similar use of technology	Software Licenses and Fair Use	Referencing Style
11:01-11:45	Workshop	Workshop	Workshop
11:46-1:00	LUNCH BREAK		
1:01-2:00	Equitable Access to Technology	Copyright, Trademark and Patent	Intro to Action Research
2:01-2:30	Workshop	Workshop	Presentation of Output
2:31- 3:30	Identifying and Addressing Cyber Bullying	Basic concepts of Intellectual Property Rights	
4:00-4:30	Workshop	Reflection	Closing Ceremony

c. Third Quarter

Pedagogical

TIME	ACTIVITIES		
	DAY 1	**DAY 2**	**DAY 3**
7:00-7:30	Arrival and Registration	Arrival and Registration	Arrival and Registration
7:31-8:00	Opening Program and Training Overview	Recap	Recap

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8:01-9:30	Teaching tools and methods using ICT	ICT Based Communication • Online conference • Group Chat/Forum	Assessment Tools and Methods using ICT
9:31-9:50	BREAK		
9:51-10:20	Teaching and Learning Tools (hardware and software)	Workshop	Workshop
10:21-11:20	Workshop	ICT Based Information System	Online Storage and File Sharing Platform
11:21-12:00	Presentation of Output	Reflection	Workshop
12:01-1:00	LUNCH BREAK		
1:01-2:30	ICT as a catalyst for student and project-centered learning	ICT Assisted Self-Assessment for Teachers and Learners	Online Portfolio
2:31-3:20	Workshop	Workshop	Presentation of Output
3:21- 4:00	Presentation of Output	Presentation of Output	
4:00-4:30	Reflection	Reflection	Closing Ceremony

d. Fourth Quarter

ICT Competence Along Professional Domain

TIME	ACTIVITIES		
	DAY 1	**DAY 2**	**DAY 3**
7:00-7:30	Arrival and Registration	Arrival and Registration	Arrival and Registration
7:31-8:00	Opening Program and Training Overview	Recap	Recap
8:01-9:30	Exploring and Learning Emerging Technology in Facilitating Learning	Download and Upload: Accessing and Sharing Learning Material Online	ICT Related Action Research Overview
9:31-9:50	BREAK		
9:51-10:20	Online Community: Exploring Best Practices without Bounds	Workshop	Workshop
10:21-11:20		Video Lesson	Online Journal and References
11:21-12:00	Reflection	Workshop	Workshop
12:01-1:00	LUNCH BREAK		
1:01-2:30	Interactive/Multimedia Classroom	Video Lesson Presentation	Presentation of Title Proposal
2:31-3:20			
3:21- 4:00	Output Presentation/Reflection		
4:00-4:30			Closing Ceremony

Conclusion

The analysis of the study data employed a framework analysis approach, yielding several noteworthy conclusions. Firstly, it was found that baby boomer teachers possess a "basic" level of ICT competence, as assessed against the NCIS-Teacher's standards. Secondly, these educators demonstrated a high level of proficiency in their pedagogical performance, aligning with the norms outlined in the CB-PAST Framework. Thirdly, a significant relationship was observed between the ICT competence of baby boomer teachers and their pedagogical performance.

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Lastly, the study revealed that negative attitudes toward ICT, educational backgrounds, and the absence of institutional support were commonly cited as factors associated with the ICT competency level and pedagogical performance of baby boomer teachers.

Based on these research findings, a series of training workshops has been proposed to enhance the ICT competency of teachers. These workshops will focus on developing the four domains specified in the NICS-Teacher framework, aiming to bridge the identified gaps and improve the overall effectiveness of baby boomer teachers in utilizing ICT for teaching.

Recommendations

Based on the findings and conclusions the following recommendations are suggested:

1. Baby boomer teachers may update themselves with the most recent skills and knowledge in using ICT devices and their functions by exposing themselves to training to focus on ICT integration to the teaching and learning and technology-driven lessons available on the web and others.
2. Baby boomer teachers may familiarize themselves with the ethical standards, and the safe use of ICT.
3. The researchers suggest that the Department of Education revisits its policy on providing the schools with the necessary ICT equipment and tools for the teachers and learners.
4. Baby boomer teachers may be encouraged to share their expertise as resource speakers in In-Service Trainings(INSET) and LAC Sessions, especially where which they have identified themselves as highly proficient. This expertise is extremely valuable especially to the younger generation of teachers.
5. The researcher proposed that the teachers constantly expose themselves to the use of ICT and explore available ways of improving their ICT competence and its integration into the teaching and learning process. This may include online through synchronous or asynchronous webinars or face-to-face seminars, training, and workdhops.
6. The school administrators are also encouraged to design introductory ICT seminars to bridge the technological gap between the different generations of teachers in their jurisdiction.
7. Teachers are encouraged to develop a strong workplace culture that fosters collaboration and promotes a supportive atmosphere where no one left out or ignored.
8. The researcher recommends that the Department of Education provide basic ICT training and seminars to cater not only to baby boomer teachers but also to teachers who have difficulties taking advantage of ICT's benefits. The department should also provide the teachers with updated ICT equipment, devices, software, and applications for actual training and for teaching.

REFERENCES

Ahmed, G., Arshad, M., & Tayyab, M. (2019). *Study of Effects of ICT on professional development of teachers at university level*. European Online Journal of Natural and Social Sciences: Proceedings. https://european-science.com/eojnss_proc/article/view/5781

Alzain, H. A. (2019). The role of social networks in supporting collaborative e-learning based on connectivism theory among students of PNU. *The Turkish Online Journal of Distance Education*, 46–63. https://doi.org/10.17718/tojde.557736

Artacho, E. G., Martínez, T. S., Ortega-Martín, J. L., Marín-Marín, J., & García, G. G. (2020). Teacher Training in Lifelong Learning—The importance of Digital Competence in the encouragement of teaching Innovation. *Sustainability*, *12*(7), 2852. https://doi.org/10.3390/su12072852

Boyraz, S., & Ocak, G. (2021, March 3). Connectivism: A literature review for the new pathway of pandemic driven education. https://www.researchgate.net/profile/Serkan-Boyraz/publication/ 350966425_ Connectivism_A_Literature_Review_for_the_New_Pathway_of_Pandemic_Driven_Education/links/607d4d27 2fb9097c0cf3e8f1/Connectivism-A-Literature-Review-for-the-New-Pathway-of-Pandemic-Driven-Education.pdf

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The Exigency P - ISSN 2984-7842 E - ISSN 1908-3181

Corbett, F., & Spinello, E. (2020). Connectivism and leadership: harnessing a learning theory for the digital age to redefine leadership in the twenty-first century. *Heliyon*, 6(1), e03250. https://doi.org/10.1016/j.heliyon.2020.e03250

DEPED 2020. DepEd Order No. 11 s. 2020**.** Revised Guidelines on the Alternative Work Arrangements in the Department of Education During the Period of State of National Emergency Due to Covid-19 Pandemic . Retrieved from https://www.deped.gov.ph/wp-content/uploads/2020/06/DO_s2020_011-Revised-Guidelines-on-Alternative-Work-Arrangements.pdf

DEPED 2020. DepEd Order No. 12 s.2020. Adoption of the Basic Education Learning Continuity Plan for School Year 2021-2022 in Light of the Covid-19 Public Health Emergency. Retrieved from https://authdocs.deped.gov.ph/deped-order/do_s2020_012-adoption-of-the-be-lcp-sy-2020-2021/

Faloye, S. T., Ranjeeth, S., & Ako-Nai, S. A. (2022). Understanding age differences in technophobia: A South African case study. *South African Computer Journal*, *34*(1). https://doi.org/10.18489/sacj.v34i1.1039

Fang, M. L., Canham, S. L., Battersby, L., Sixsmith, J., Wada, M., & Sixsmith, A. (2018). Exploring privilege in the digital divide: Implications for theory, policy, and practice. *The Gerontologist*. https://oi.org/10.1093/geront/gny037

Haydn, T., & Barton, R. (2008). 'First do no harm': Factors influencing teachers' ability and willingness to use ICT in their subject teaching. *Computers & Education*, *51*(1), 439–447. https://doi.org/10.1016/j.compedu.2007.06.001

Jadhav, V. (2011). ICT and teacher education. *International Educational E-Journal*, *1*(1), 64-69.

Jung, I. (2019). Connectivism and networked learning. *Springer Briefs in Education*. https://doi.org/10.1007/978-981-13-7740-2_6

Kodrat, D. (2020). Mindset Shift in Cyber Pedagogy: A Teacher's Strategy upon Learning from Home. *Jurnal Kajian Peradaban Islam*, *3*(2). https://doi.org/10.47076/jkpis.v3i2.49

Lawrence, J. E., & Tar, U. A. (2018). Factors that influence teachers' adoption and integration of ICT in teaching/learning process. *Educational Media International*, *55*(1), 79–105. Retrieved from https://doi.org/10.1080/09523987.2018.1439712

Lin, M., Chen, H., & Liu, K. S. (2017). A Study of the Effects of Digital Learning on Learning Motivation and Learning Outcome. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(7). Retrieved from https://doi.org/10.12973/eurasia.2017.00744a

Momanyi, D. N., & Del Mundo, E. M. (2022). Challenges and Adaptation Mechanisms of International Students Amidst Flexible Learning. *International Journal of Open-access, Interdisciplinary and New Educational Discoveries of ETCOR Educational Research Center (iJOINED ETCOR)*, 1(3), 30-38.

Muslem, A., Yusuf, Y. Q., & Juliana, R. (2018). PERCEPTIONS AND BARRIERS TO ICT USE AMONG ENGLISH TEACHERS IN INDONESIA. *Teaching English With Technology*, *18*(1), 3–23. http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.desklight-34ba375d-50d4-4341-9c9b-6e6fd275c1c0/c/ARTICLE1.pdf

Nortvig, A., Petersen, A. K., & Balle, S. H. (2018, February 1). *A literature review of the factors influencing E-Learning and blended learning in relation to learning outcome, student satisfaction and engagement*. https://academic-publishing.org/index.php/ejel/article/view/1855

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E - ISSN 2945-3577
The Exigency
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E - ISSN 1908-3181

Owo, O. T., & Udoka, I. A. (2021). Perception of educational stakeholders on utilization of e-learning technology for quality instructional delivery in universities in Rivers State, Nigeria. *Journal of Learning for Development*, 8(2), 312–326. https://doi.org/10.56059/jl4d.v8i2.472

Petalla, M. B. (2022). Exploring the digital transformation of Teaching-Learning Experiences of the baby Boomer Generation. *Philippine Social Science Journal*, *5*(1), 90–96. https://doi.org/10.52006/main.v5i1.471

Polat, S., Çelik, Ç., & Okçu, Y. (2019b). School Administrators' Perspectives on Teachers From Different Generations: SWOT Analysis. *SAGE Open*, *9*(3), 215824401986149. Retrieved from https://doi.org/10.1177/2158244019861499

Prestridge, S. (2019). Categorising teachers' use of social media for their professional learning: A self-generating professional learning paradigm. *Computers & Education*, *129*, 143–158. Retrieved from https://doi.org/10.1016/j.compedu.2018.11.003

Republic Act No. 10912, Continuing Professional Development Act of 2016. Retrieved from. https://legacy.senate.gov.ph/lisdata/3221230250!.pdf

Rodríguez, M. D. (2021). Technology Leadership: Assessing the competency level of high school administrators and teachers in the use of ICTs. *Journal of Educational Management & Social Sciences*, *1*(1), 1–13. https://doi.org/10.48112/jemss.v1i1.227

Romanes, M. a. J., & Veniegas, S. (2018). Differences among Generational Groups of Teachers in a Public School District in Their Practice of 21st. ResearchGate. https://www.researchgate.net/publication/327954410_Differences_among_Generational_Groups_of_Teachers_in_a_ Public_School_District_in_Their_Practice_of_21st_Century_Teaching-Learning_Skills

Siemens, G. (2004). *Connectivism: A learning theory for the digital age.* http://www.elearnspace.org/Articles/connectivism.htm

Tiquis, M. V. V. (2023). FADS (FAQES All-in-One Digital Stories): Innovative Materials in Addressing Learning Gaps in Numeracy and Literacy. *International Journal of Open-access, Interdisciplinary and New Educational Discoveries of ETCOR Educational Research Center (iJOINED ETCOR)*, 2(3), 185-190. https://etcor.org/storage/Vol.%20II(3),%20185-190.pdf

Venter, E. (2017). Bridging the communication gap between Generation Y and the Baby Boomer generation. *International Journal of Adolescence and Youth*, *22*(4), 497–507. Retrieved from https://doi.org/10.1080/02673843.2016.1267022

Vyalikova, Galina & Plekhanova, Maria & Pluzhnikova, Julia & Savelyeva, Svetlana. (2019). General Pedagogical ICT Competency as a Content-forming Factor in the Training of a New Teacher. ARPHA Proceedings. 1. 775-783. 10.3897/ap.1.e0736.

Zariņa, I., Circenis, K., & Erts, R. (2018). Measuring the technophobia among middle-aged and older adults in Latvia: A pilot study. *SHS Web of Conferences*, *51*, 02003. https://doi.org/10.1051/shsconf/20185102003