

Information and Communication Technology Implementation and its Influence on the Productivity and Efficiency of Senior High School Teachers in Baleno District

John Laurio Candidato

Teacher V, Lagta National High School, Baleno District, Division of Masbate Province, Masbate, Philippines

Email of Corresponding Author: john.candidato@deped.gov.ph

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Abstract

This study examined Information and Communication Technology (ICT) utilization and the perceived importance of factors influencing teaching productivity and efficiency among senior high school teachers in Baleno District, Masbate, Philippines. Anchored in the Technological Pedagogical Content Knowledge (TPACK) framework and the digital education ecosystem perspective, the study employed a quantitative descriptive survey design involving 50 teachers selected through stratified random sampling. Data were collected using a structured questionnaire and analyzed through descriptive statistical techniques, including frequencies, percentages, means, and standard deviations. The findings revealed equal gender representation, comprising 25 male and 25 female respondents. ICT utilization obtained an overall mean of 4.3, indicating frequent integration of digital technologies into instructional activities. The utilization of ICT services, online resources, multimedia materials, and digital communication platforms each recorded a mean of 4.5, while digital assessment obtained a comparatively lower mean of 3.5. Furthermore, classroom environment, curriculum and lesson planning, student engagement, assessment and feedback, and professional development each received a mean of 5.0, indicating their perceived importance to teaching productivity and efficiency. The study concludes that ICT is frequently utilized in teaching, although its actual influence on productivity and efficiency cannot be established through descriptive findings alone. Continued investment in ICT infrastructure, professional development, and digital assessment practices is recommended. The study primarily supports Sustainable Development Goal 4 (Quality Education) and indirectly relates to SDG 9 (Industry, Innovation and Infrastructure) by informing technology-related educational planning. Its sustainability contribution lies in providing localized evidence that may strengthen educational, technological, and institutional sustainability through informed resource allocation, continuous professional development, and responsible ICT integration.

Keywords: Digital Assessment; Educational Sustainability; ICT Utilization; Professional Development; Teaching Efficiency; Teaching Productivity; Technology Integration

1. Introduction

The integration of Information and Communication Technology (ICT) into education has reshaped how teachers prepare instructional materials, deliver lessons, assess student performance, communicate with learners, and

perform professional responsibilities. Digital resources and communication platforms offer opportunities to improve the organization and delivery of educational activities. However, their contribution to teaching productivity and efficiency depends on how technology is utilized, the competencies of teachers, and the institutional conditions supporting its implementation. The Organisation for Economic Co-operation and Development (OECD, 2023) emphasizes that effective digital education requires more than technological infrastructure, highlighting the importance of teacher competence, instructional resources, and institutional support. Similarly, the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2023) stresses that educational technology must be appropriate, equitable, evidence-based, and sustainable to provide meaningful educational benefits. Within this context, examining ICT utilization among senior high school teachers is necessary to understand how digital technologies are incorporated into teaching responsibilities and how educators perceive the factors associated with their productivity and efficiency. The present study focuses on senior high school teachers in Baleno District, Masbate, Philippines, particularly their frequency of ICT utilization and perceptions concerning the importance of classroom environment, curriculum and lesson planning, student engagement, assessment and feedback, and professional development. Through a quantitative descriptive approach, the investigation seeks to provide contextual evidence that may inform professional development, technology-related resource planning, and institutional strategies for improving teaching practices. Its contribution lies in providing district-level information that may support more responsive and sustainable educational management.

Information and Communication Technology (ICT) plays an important role in contemporary education by supporting instructional preparation, communication, assessment, and learning management. Digital platforms enable teachers to access educational resources, develop multimedia materials, and organize instructional activities more efficiently. Technology also has the potential to simplify repetitive tasks and improve work performance (Yan., 2018). According to Tinio (2003), ICT encompasses technological tools used for communication and information management. The OECD (2023) emphasizes that effective ICT integration requires competencies beyond basic technological skills, particularly the ability to align digital resources with instructional objectives. Teaching productivity and efficiency involve accomplishing instructional responsibilities while effectively managing time, resources, and effort. Although ICT can support these functions, frequent technology utilization does not necessarily guarantee improved teaching performance. UNESCO (2023) emphasizes that educational technology should be evaluated according to its demonstrated instructional value. Similarly, Akram et al. (2022) identified technological infrastructure, connectivity, and professional preparation as important considerations in ICT integration, while Althubyani (2024) highlighted the significance of teachers' digital competencies and institutional conditions. In the Philippines, the Department of Education (DepEd, 2022), through the Basic Education Development Plan 2030, emphasizes improving educational quality, accessibility, resilience, and governance. Consistent with these priorities, the present study examines ICT utilization and perceived productivity- and efficiency-related factors among senior high school teachers in Baleno District. It recognizes that effective technology integration requires appropriate digital resources, professional competencies, and supportive instructional environments.

Recent literature on ICT integration highlights interconnected factors influencing teaching productivity and efficiency, including instructional technology utilization, digital competence, assessment and communication, professional development, and institutional support. Abedi (2024) found that teachers frequently utilized technology for lesson preparation and instructional delivery, although its application to interactive and learner-centered teaching remained limited. The OECD (2023) emphasizes that effective technology integration requires teaching-specific digital competencies beyond basic technological skills. Similarly, Althubyani (2024) identifies professional engagement, digital resources, instructional practices, assessment, and learner empowerment as essential dimensions of teachers' digital competence. These findings suggest that ICT effectiveness depends on aligning technological applications with pedagogical objectives. Philippine studies further emphasize the importance of teacher competence and institutional conditions. Lagos and Nabos (2023) reported varying levels of digital competence among public school teachers, particularly in communication, content development, online safety, and problem-solving. Ayunar et al. (2024) identified professional preparation, educational attainment, and supportive working conditions as relevant factors in ICT competency, while Cortez (2025) documented moderate digital competence among secondary school teachers. These findings highlight the need for context-specific professional development and institutional support to strengthen technology integration. Digital assessment and communication also support instructional responsibilities, including student evaluation, feedback, information management, and academic coordination. However, the OECD (2023) emphasizes that their effectiveness depends on accessibility, teacher competence, and instructional suitability. UNESCO (2023) likewise cautions that frequent technology utilization does not automatically translate into improved educational outcomes. As demonstrated by Abedi (2024), digital technology adoption may coexist with conventional teaching practices. Overall, the literature establishes that effective ICT integration requires a combination of technological competence, pedagogical alignment, institutional resources, and continuous professional development. These insights justify the present study's examination of ICT utilization and teachers' perceptions of productivity- and

efficiency-related factors in Baleno District, while recognizing that frequent technology use alone does not establish measurable improvements in teaching performance.

At the global level, educational digitalization has become essential to improving teaching quality, educational access, and institutional resilience. The OECD (2023) emphasizes that effective digital education requires appropriate technological infrastructure, instructional resources, governance, and teacher competencies. Similarly, UNESCO (2023) highlights the importance of aligning educational technology with learning needs while addressing challenges involving accessibility, infrastructure, and professional preparation. Regionally, the report developed by UNESCO and the Southeast Asian Ministers of Education Organization (SEAMEO, 2023) underscores the need for equitable, appropriate, and sustainable technology integration across Southeast Asian educational systems. These perspectives demonstrate that effective ICT implementation depends not only on technological availability but also on institutional support and teachers' professional capabilities. In the Philippines, the Basic Education Development Plan 2030 provides a strategic framework for improving educational quality, equity, resilience, and governance (DepEd, 2022). Philippine studies further demonstrate variations in teachers' digital competencies and technology integration practices. Lagos and Nabos (2023) reported differences in digital competencies among public school teachers in Quezon, while Ayunar et al. (2024) identified factors associated with ICT competency among teachers in Bukidnon. Similarly, Cortez (2025) documented digital competency gaps among secondary school teachers. These findings emphasize the need for context-specific professional development and institutional support to strengthen educational technology integration. At the local level, the present study examines ICT utilization and perceived factors influencing teaching productivity and efficiency among 50 senior high school teachers in Baleno District, Masbate. Specifically, it investigates the frequency of using digital resources, multimedia materials, electronic assessments, and communication platforms, alongside teachers' perceptions of classroom environment, curriculum planning, student engagement, assessment, and professional development. The study addresses the need for localized evidence that may inform instructional planning, professional development, and institutional improvement. However, its descriptive, self-reported findings do not establish causal relationships or directly measure improvements in teaching productivity and efficiency.

The study may be interpreted through the Technological Pedagogical Content Knowledge (TPACK) framework and the contemporary concept of a digital education ecosystem. These complementary perspectives provide a foundation for understanding ICT utilization as a process involving the interaction of technological resources, instructional responsibilities, teacher competencies, and institutional conditions. Their relevance is supported by contemporary literature emphasizing that successful technology integration requires the coordination of digital tools with educational objectives and professional practices (OECD, 2023; Althubayani, 2024). The TPACK framework emphasizes the interconnected roles of technological knowledge, pedagogical knowledge, and content knowledge in educational practice. From this perspective, teachers' ability to utilize digital tools meaningfully depends on their capacity to select appropriate technologies, apply effective instructional strategies, and communicate subject-specific content. Althubayani (2024) identifies TPACK among the established frameworks used to understand teachers' digital competence and technology integration. Its application to the present study helps explain why ICT utilization should be considered in connection with lesson planning, multimedia instruction, assessment, and student engagement rather than being evaluated exclusively through technological availability. Technological knowledge concerns teachers' familiarity with digital resources, applications, and communication platforms. Pedagogical knowledge relates to instructional organization, learner participation, assessment, and feedback. Content knowledge involves the subject matter that teachers are expected to teach. Their integration offers a conceptual explanation of how ICT may support professional teaching responsibilities when technological applications are aligned with appropriate instructional purposes. However, the present study does not directly measure all TPACK components and therefore does not constitute a formal empirical test of the framework. TPACK serves as an interpretive perspective for understanding the educational relevance of the reported ICT practices. The digital education ecosystem perspective complements TPACK by recognizing the broader institutional conditions that support technology integration. The OECD (2023) identifies technological infrastructure, digital educational resources, human competencies, and governance arrangements as interconnected components of digital education. This perspective highlights that teachers' use of ICT is situated within an organizational environment that may facilitate or constrain the implementation of technology-supported instruction. It is particularly relevant to the study's consideration of the classroom environment and professional development as perceived contributors to teaching productivity and efficiency. Conceptually, the study distinguishes between two descriptive dimensions. The first is ICT utilization, reflected in the reported frequency of using digital services, online instructional resources, multimedia materials, digital assessments, and electronic communication. The second is teachers' perceived importance of factors associated with productivity and efficiency, including classroom environment, curriculum and lesson planning, student engagement, assessment and feedback, and professional development. These dimensions are examined descriptively rather than through a tested causal model. The proposed conceptual orientation recognizes that technology use and productivity-related perceptions are relevant but analytically distinct. Frequency of ICT utilization describes how often particular digital practices are reported, whereas importance ratings reflect respondents' judgments about factors affecting

their professional work. Without direct productivity measures or inferential analysis, the study cannot determine the magnitude or direction of an actual relationship between ICT utilization and teaching productivity. Nevertheless, the conceptual perspectives provide a systematic basis for interpreting the findings and identifying areas that may warrant further investigation.

Despite growing research on educational technology, gaps remain in understanding ICT utilization and its relationship to teaching productivity and efficiency across different educational settings. Abedi (2024) found that teachers frequently use technology for instructional preparation and delivery without necessarily adopting more interactive teaching approaches. Similarly, UNESCO (2023) emphasizes that frequent technology utilization does not automatically demonstrate improved educational outcomes. These findings highlight the need to distinguish ICT adoption from measurable improvements in teaching performance, instructional quality, and resource efficiency. Philippine studies by Lagos and Nabos (2023), Ayunar et al. (2024), and Cortez (2025) reveal variations in teachers' digital competencies, professional experiences, and institutional support, emphasizing the importance of localized investigations. The OECD (2023) further stresses that effective digital education depends on the interaction of technological resources, teacher competencies, and institutional conditions. These findings suggest that ICT utilization should be examined alongside classroom environment, curriculum planning, student engagement, assessment practices, and professional development rather than as an isolated factor influencing teaching effectiveness. The present study addresses these gaps by examining ICT utilization and teachers' perceptions of productivity- and efficiency-related factors among senior high school teachers in Baleno District. It provides localized descriptive evidence that may inform instructional planning, professional development, and institutional improvement. However, the study does not establish causal relationships or directly measure productivity gains. Future research may incorporate objective performance indicators, workload assessments, and inferential analyses to better determine the relationship between ICT utilization and teaching productivity and efficiency.

The present study primarily aligns with Sustainable Development Goal 4 (SDG 4), Quality Education, by examining ICT utilization and factors associated with teachers' productivity and efficiency. The United Nations Statistics Division (2024) emphasizes teacher training, accessible learning environments, and reducing digital inequalities as important elements of educational development. Particularly relevant is SDG Target 4.c, which promotes qualified teachers through professional preparation and development. UNESCO (2024) likewise highlights the importance of teacher competencies, institutional support, and sustainable working conditions. The study also indirectly supports SDG Targets 4.a and 4.4 by examining classroom conditions and ICT utilization, which may inform improvements in digital instructional resources and professional development. However, it does not directly measure teacher qualifications, learners' digital competencies, or educational outcomes. The study also relates to Sustainable Development Goal 9 (SDG 9), Industry, Innovation and Infrastructure, particularly Target 9.c, which emphasizes access to information and communication technology. The OECD (2023) recognizes digital infrastructure and institutional support as essential components of effective technology integration. By documenting ICT utilization among senior high school teachers in Baleno District, the research provides localized evidence that may guide educational planning, resource allocation, and professional development. Although the study does not directly measure infrastructure adequacy, productivity improvements, or SDG achievement, it supports evidence-informed educational decisions consistent with UNESCO's (2023) emphasis on responsible and sustainable technology integration.

The study contributes to multidisciplinary sustainability by addressing educational, technological, and institutional sustainability, alongside teachers' professional well-being. Educational sustainability emphasizes the continuous improvement of instructional practices through appropriate technology integration and professional development. UNESCO (2023) stresses that digital technologies should complement effective teaching rather than replace meaningful teacher–student interaction. Similarly, the OECD (2023) highlights the importance of coordinated technological infrastructure, digital competencies, instructional resources, and governance in sustaining educational digitalization. These perspectives emphasize that sustainable ICT integration requires both technological resources and institutional capacity to support their effective utilization. Institutional sustainability involves evidence-based educational planning, resource allocation, and continuous professional development. Ayunar et al. (2024) emphasize the importance of supportive institutional conditions and professional preparation in strengthening teachers' ICT competencies. Furthermore, UNESCO (2024) recognizes the significance of teacher support and professional development in maintaining resilient educational systems. The study also has implications for community and socio-economic sustainability by supporting educational practices that may prepare learners for an increasingly digital society. UNESCO and SEAMEO (2023) emphasize that educational digitalization must remain equitable, appropriate, and sustainable to contribute meaningfully to broader development objectives. Overall, the study provides localized evidence on ICT utilization and perceived productivity- and efficiency-related factors among senior high school teachers in Baleno District. Its findings may inform professional development, instructional improvement, resource prioritization, and sustainable institutional planning. However, the study does not directly measure improvements in teaching performance, teacher well-being, socio-economic outcomes, or environmental sustainability. Its principal contribution lies in providing

descriptive evidence that may guide responsible ICT integration and support long-term educational and institutional improvement.

2. Material and methods

2.1 Research Design

The study utilized a quantitative descriptive research design employing a survey method to examine ICT utilization and teachers' perceptions of factors affecting their productivity and efficiency. According to Maree and colleagues, quantitative research involves the systematic and objective examination of numerical data collected from a selected sample of a population. This approach was appropriate for describing respondents' reported ICT practices and evaluating the perceived importance of factors associated with their teaching responsibilities. The descriptive survey design facilitated the collection of standardized responses and the numerical presentation of findings through descriptive statistical analysis.

2.2 Locale of the Study

The study was conducted in Baleno District, focusing on senior high school teachers and their utilization of Information and Communication Technology in teaching-related activities. The district served as the research setting for examining how teachers use digital resources, instructional technologies, and communication platforms in performing their professional responsibilities. The investigation also considered teachers' perceptions of factors relevant to productivity and efficiency within their instructional environment.

2.3 Respondents of the Study

The respondents consisted of 50 senior high school teachers in Baleno District. These teachers served as the primary sources of information regarding ICT utilization and factors perceived to influence teaching productivity and efficiency. Their responses provided quantitative data concerning the frequency of technology use in instructional activities and the importance of selected factors associated with their teaching responsibilities.

2.4 Sample and Sampling Procedure

The study utilized stratified random sampling to select 50 teacher respondents from the target population. This sampling approach was adopted because surveying all teachers across the educational setting was considered impractical. The selected respondents constituted the study sample and provided the information necessary to describe ICT utilization and perceived productivity-related factors. Their questionnaire responses formed the basis of the descriptive statistical analysis.

2.5 Research Instrument

Data were collected using a structured questionnaire consisting of three components covering respondents' demographic information, ICT utilization, and factors influencing teaching productivity and efficiency. The first component gathered demographic and background information, including age, sex or gender, income, and other personal characteristics. The second component examined the frequency of ICT utilization in teaching-related activities, particularly the use of digital services, online instructional resources, multimedia materials, digital assessment platforms, and electronic communication with students. Responses were measured using a five-point frequency scale: 1 – Not at all, 2 – Infrequently, 3 – Occasionally, 4 – Quite Frequently, and 5 – Always. The third component assessed the perceived importance of factors associated with teaching productivity and efficiency, including classroom environment, curriculum and lesson planning, student engagement and participation, assessment and feedback, and professional development and training. A five-point importance scale was utilized, ranging from 1 – Not at all significant to 5 – Very important. The questionnaire provided standardized numerical responses for describing teachers' ICT practices and evaluating their perceptions of productivity-related factors.

2.6 Data Gathering Procedure

Data were gathered through a questionnaire-based survey involving the selected senior high school teachers in Baleno District. The questionnaire was used to obtain information regarding respondents' demographic characteristics, frequency of ICT utilization, and perceived importance of factors influencing teaching productivity and efficiency. Revisions were made to the questionnaire to promote uniformity and ensure the inclusion of the required information. The collected responses were organized for quantitative analysis using the established measurement scales.

2.7 Data Analysis Techniques

The collected data were analyzed using descriptive statistical techniques, including frequency counts, percentages, means, modes, and standard deviations. Frequency counts and percentages were used to summarize the respondents' demographic characteristics, while mean scores were utilized to describe the frequency of ICT utilization and the perceived importance of productivity-related factors. Standard deviations were included among the statistical measures used to describe the distribution of numerical responses. The mean ratings for ICT

utilization were interpreted using the five-point frequency scale, while the ratings for teaching productivity and efficiency factors were interpreted using the five-point importance scale. Microsoft Excel and other statistical software were used to organize and process the quantitative data. These descriptive procedures provided a numerical summary of respondents' reported ICT practices and perceptions of teaching-related factors.

3. Results and Discussion

3.1 Profile of the respondents Demographic Profile of the Respondents

3.1.1 Gender Distribution of Senior High School Teachers

The study involved 50 senior high school teachers, consisting of 25 males (50%) and 25 females (50%). The findings indicate equal gender representation within the surveyed sample. This distribution provides descriptive information about the composition of the respondents and establishes the demographic context for examining ICT utilization and perceived productivity-related factors. The balanced distribution allows the study to incorporate responses from equal numbers of male and female teachers. However, it does not establish whether ICT utilization or teaching productivity differs according to gender, since no gender-based comparison was reported. Claro et al. (2024), in their systematic review of quantitative research on teachers' digital competencies, identified demographic characteristics among the factors examined in relation to technology-related competencies while emphasizing inconsistencies in their measurement. Similarly, Yang et al. (2023) highlighted variations in the conceptualization and assessment of digital competence among teachers. These findings suggest that demographic characteristics may be relevant to technology integration research, although the present investigation does not provide sufficient evidence to establish gender-related differences.

3.2 Extent of Information and Communication Technology Utilization

3.2.1 Utilization of ICT Services, Online Resources, and Multimedia Materials

The findings revealed a high reported frequency of ICT utilization among senior high school teachers, with an overall mean of 4.3, interpreted as "Always" under the study's rating scale. The utilization of ICT services, online instructional resources, and multimedia materials each obtained a mean of 4.5. These results indicate that respondents frequently incorporated digital technologies into their instructional activities. The consistent ratings across these indicators suggest that ICT tools formed part of the teachers' regular instructional practices. The findings are consistent with contemporary research recognizing the increasing integration of digital resources into teaching responsibilities. Bui (2022), in a systematic review of English teachers' technology integration, found that digital technologies were commonly employed for instructional purposes, particularly those supporting teacher-directed activities. Similarly, Heine et al. (2023) emphasized that the selection and utilization of digital resources represent important components of teachers' professional digital competence. Msafiri et al. (2023) further identified the potential of ICT to support instructional preparation, curriculum delivery, and access to educational resources in secondary education. Taken together, these studies support the relevance of the respondents' frequent technology utilization. Nevertheless, the reported frequency of ICT use should be distinguished from its effectiveness because the present study did not directly assess instructional quality, time savings, or improvements in teaching performance.

3.2.2 Utilization of Digital Communication Platforms

The respondents reported frequent utilization of digital communication channels for interacting with students, obtaining a mean score of 4.5, interpreted as "Always." This finding indicates that electronic communication was regularly incorporated into teachers' instructional responsibilities. The result places digital communication among the most frequently reported ICT-supported activities in the study, alongside the use of online resources, multimedia materials, and other ICT services. Digital communication represents an important component of technology-supported educational practice because it provides additional channels for coordinating instructional activities and exchanging academic information. Wohlfart and Wagner (2023), through an umbrella review of teachers' roles in educational digitalization, identified technology integration as a multidimensional process influenced by teachers' digital competencies, institutional conditions, and instructional requirements. Hennessy et al. (2022) likewise recognized the role of digital communication and social messaging technologies in supporting professional interaction and collaborative learning. These studies provide a broader context for understanding the relevance of electronic communication in educational settings. However, the present findings establish only its reported frequency of use and do not determine whether digital communication reduced workload or improved student engagement.

3.2.3 Utilization of Digital Assessment Platforms

The use of digital platforms for conducting assessments obtained a mean score of 3.5, interpreted as "Quite Frequently." Although the result indicates that teachers utilized digital assessment tools, it was lower than the mean scores of 4.5 recorded for the other ICT-utilization indicators. The findings therefore demonstrate a difference in the reported frequency of ICT use across instructional activities, with digital assessment receiving the lowest mean rating among the five indicators examined. This finding is relevant to the distinction between general technology utilization and specialized instructional applications. Børte et al. (2023), through a systematic

review of technology-supported formative assessment, identified the importance of aligning digital tools with pedagogical practices and strengthening teachers' capacity to interpret assessment information. Similarly, Nguyen and Habók (2024) observed that digital literacy assessment frameworks encompass several professional competencies, including the ability to apply technology to learner assessment. These findings suggest that digital assessment involves specific pedagogical and technological considerations beyond general familiarity with digital platforms. The comparatively lower rating in the present study may therefore identify an instructional activity warranting further assessment and professional support. However, the questionnaire results do not establish the reasons for this difference, and it would be inappropriate to attribute the rating to inadequate training, limited connectivity, or technological barriers without additional evidence.

3.3 Perceived Importance of Factors Influencing Teaching Productivity and Efficiency

3.3.1 Classroom Environment and Curriculum Planning

The respondents rated the classroom environment and curriculum and lesson planning as "Very Important" to their productivity and efficiency, with each indicator obtaining a mean score of 5.0. These results indicate that teachers assigned the highest level of importance on the study's five-point scale to the conditions in which instruction takes place and the organization of teaching activities. The findings establish these two factors as highly valued aspects of the respondents' professional responsibilities. The importance attributed to classroom environment and lesson planning is consistent with research emphasizing the interaction between instructional conditions and teachers' professional practices. The OECD (2024) recognizes that teaching quality depends partly on appropriate learning environments, instructional preparation, professional capabilities, and institutional support. Similarly, Msafiri et al. (2023) identified curriculum alignment and suitable educational resources as important considerations in ICT integration within secondary schools. These perspectives indicate that educational technologies should be considered alongside the broader instructional environment rather than as independent solutions to teaching challenges. The results of the present investigation reflect teachers' perceived importance of these conditions but do not measure their actual effects on productivity or efficiency.

3.3.2 Student Engagement and Participation

Student engagement and participation obtained a mean score of 5.0, interpreted as "Very Important." The findings indicate that respondents regarded learner involvement as an important consideration in performing their teaching responsibilities. This result reflects the highest rating on the instrument's importance scale and places student engagement alongside the other instructional factors identified by the respondents. The emphasis on student participation corresponds with literature examining the relationship between instructional approaches and meaningful technology integration. Wohlfart and Wagner (2023) found that effective educational digitalization involves teachers' pedagogical knowledge and their ability to integrate technologies within instructional practice. Similarly, Msafiri et al. (2023) recognized opportunities for ICT-supported instruction to encourage more participatory and individualized educational experiences. These perspectives suggest that technology integration should be considered in relation to learner involvement rather than exclusively through the availability or frequency of digital tool utilization. However, because the present study did not measure actual student participation or learning outcomes, the results demonstrate teachers' perceived importance of engagement rather than an observed improvement in learner performance.

3.3.3 Assessment and Feedback

The perceived importance of assessment and feedback obtained a mean score of 5.0, interpreted as "Very Important." This result indicates that respondents assigned the highest importance rating to assessment-related responsibilities in relation to teaching productivity and efficiency. When considered alongside the lower frequency rating of 3.5 for digital assessment utilization, the findings show that teachers regarded assessment and feedback as highly important while reporting comparatively less frequent use of digital platforms for assessment activities. This distinction is consistent with research emphasizing that the pedagogical importance of assessment does not necessarily correspond to the extent of technology-supported assessment implementation. Børte et al. (2023) identified clear assessment purposes, appropriate instructional alignment, and teachers' data literacy as important requirements for effective digital formative assessment practices. Nguyen and Habók (2024) likewise emphasized the need for appropriate instruments when evaluating teachers' digital competencies across instructional and assessment functions. These findings support the distinction between valuing assessment and applying digital technologies to conduct it. Within the present study, the difference in mean ratings identifies digital assessment as a possible area for further investigation, but it does not establish a statistically significant difference or explain the reasons for the observed pattern.

3.3.4 Professional Development and Training

Professional development and training obtained a mean score of 5.0, interpreted as "Very Important." The finding indicates that respondents assigned the highest importance rating to continuing professional learning as a factor associated with teaching productivity and efficiency. The result places professional development among the instructional and organizational considerations regarded as important by the surveyed teachers. The finding is supported by contemporary research emphasizing the role of sustained professional learning in educational

technology integration. Hennessy et al. (2022), in a systematic review of technology-supported teacher professional development in low- and middle-income countries, identified opportunities for digital technologies to facilitate professional learning while noting limitations in the available evidence concerning sustainability and measurable outcomes. Similarly, Amemasor et al. (2025) found that effective professional development for digital instructional integration commonly involved practical training, collaboration, mentoring, and institutional support. In the Philippine context, Talaue et al. (2025) identified curriculum alignment, administrative support, collaboration, and continuous learning as important considerations in professional development programs. These studies provide a scholarly basis for recognizing professional development as a relevant institutional priority. Nevertheless, the present results do not establish respondents' actual training needs, competence levels, or the effectiveness of previous professional development activities.

3.4 Overall Assessment of Productivity- and Efficiency-Related Factors

The findings revealed an overall mean score of 5.0 for the five factors examined in relation to teaching productivity and efficiency. Classroom environment, curriculum and lesson planning, student engagement and participation, assessment and feedback, and professional development and training all received the same reported mean of 5.0, interpreted as "Very Important." This pattern indicates consistently high importance ratings across the selected factors, without variation among their reported mean scores. The uniform ratings suggest that respondents considered the selected instructional and professional conditions important to the performance of their teaching responsibilities. The OECD (2025), through the Teaching and Learning International Survey 2024, emphasizes the relevance of teachers' working conditions, workload, instructional responsibilities, and professional development to the teaching profession. Likewise, Claro et al. (2024) highlight the multidimensional character of digital competence and the need for precise measurement of technology-related teaching practices. These perspectives support interpreting productivity and efficiency within a broader educational context rather than attributing them solely to ICT utilization. However, the maximum mean ratings in the present study should not be interpreted as evidence that all five factors exert identical effects on teaching performance. The questionnaire assessed their perceived importance, and the reported descriptive statistics do not establish their actual influence, relative contribution, or causal relationship with productivity and efficiency.

3.5 Synthesis of Findings on ICT Utilization and Teaching Productivity and Efficiency

The findings demonstrate that the surveyed teachers frequently utilized ICT in their instructional responsibilities, obtaining an overall utilization mean of 4.3. Online instructional resources, multimedia materials, electronic communication, and general ICT services received mean ratings of 4.5, while digital assessment obtained a lower mean of 3.5. Meanwhile, all five factors examined in relation to teaching productivity and efficiency received importance ratings of 5.0. These results provide a descriptive account of respondents' technology-use patterns and the instructional and professional conditions they regarded as important. The findings are consistent with the broader literature recognizing technology integration as a process shaped by pedagogical practices, professional competencies, and institutional support. Bui (2022) and Msafiri et al. (2023) emphasize that teachers' use of digital technologies must be considered in relation to instructional purposes, while Amemasor et al. (2025) identify continuing professional development as an important support for meaningful digital integration. The OECD (2025) also underscores the relevance of working conditions and professional responsibilities to teachers' effectiveness. Within this context, the present study contributes localized evidence regarding ICT utilization and perceived productivity-related factors among senior high school teachers in Baleno District. However, because the analysis is descriptive and does not include direct productivity measurements or inferential tests of association, the findings cannot establish that ICT implementation increased teaching productivity or efficiency. The study's contribution lies in documenting existing practices and professional priorities that may inform subsequent evaluations, professional development planning, and institutional improvement initiatives.

4. Conclusion & Recommendations

The study concludes that Information and Communication Technology (ICT) is frequently utilized by senior high school teachers in Baleno District, as reflected in the overall mean of 4.3. Teachers reported consistent utilization of digital resources, multimedia materials, and communication platforms, while digital assessment received a comparatively lower rating. Furthermore, classroom environment, curriculum and lesson planning, student engagement, assessment and feedback, and professional development were all perceived as very important factors associated with teaching productivity and efficiency, each obtaining a mean of 5.0. These findings highlight the relevance of ICT integration and supportive instructional conditions in contemporary teaching practices. However, the results establish teachers' reported ICT utilization and perceptions rather than direct evidence that technology improves teaching productivity or efficiency.

Educational institutions are encouraged to continue investing in appropriate ICT infrastructure and professional development opportunities to support teachers' effective utilization of digital technologies. School administrators should also adopt a holistic approach to instructional improvement by considering classroom conditions, curriculum planning, student engagement, assessment practices, and continuous professional learning alongside

technology integration. Particular attention may be given to strengthening the utilization of digital assessment platforms, which received the lowest frequency rating among the ICT indicators. These measures may contribute to more responsive instructional practices and the sustainable integration of ICT into teachers' professional responsibilities.

The study is limited to 50 senior high school teachers in Baleno District and relies on self-reported questionnaire responses analyzed through descriptive statistics. Consequently, the findings reflect respondents' reported ICT practices and perceived importance of productivity-related factors rather than objectively measured improvements in teaching performance. The absence of direct productivity measures and inferential statistical analysis limits conclusions regarding the actual influence of ICT on teaching productivity and efficiency. Furthermore, the findings should be interpreted within the surveyed educational setting and cannot automatically be generalized to other districts or teacher populations.

5. Compliance with ethical standards

The author declare that no conflicts of interest exist in relation to this study. The research involved a non-invasive, questionnaire-based survey of senior high school teachers in Baleno District, focusing on Information and Communication Technology (ICT) utilization and perceived factors influencing teaching productivity and efficiency. The study was guided by established ethical principles for research involving human participants, including informed consent, voluntary participation, the right to withdraw without consequence, and the protection of respondents' privacy and confidentiality. The ethical procedures emphasized the anonymous reporting of responses, secure management of collected information, and presentation of findings in aggregated form to prevent the identification of individual teachers. The research did not involve experimental interventions or the assessment of sensitive psychological or medical conditions. Institutional permission and applicable ethical requirements were recognized as essential considerations in the administration of the research instrument and the responsible handling of research data.

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