

THE IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON LEARNING IN INTERMEDIATE GRADE

MARIAN LOURDES C. CRUZ

ERLINDA M. AGBAYANI

Master of Arts in Education
Major in School Administration

Abstract

Information and Communication Technology has become an essential component of modern instruction as schools seek to improve digital literacy, learner engagement, and classroom performance in the intermediate grades. This study determined the impact of Information and Communication Technology integration on learning among intermediate-grade learners. Specifically, it described the profile of ICT teachers in terms of highest educational attainment, ICT competency, years of teaching, relevant ICT training attended, and gadgets used for instruction; assessed the ICT performance of intermediate-grade learners; examined the relationship between teacher profile and learner ICT performance; identified student-related and teacher-related problems encountered in ICT integration; and proposed intervention measures to improve performance. The study employed a descriptive-correlational research design involving 150 ICT teachers from St. Columban College in Lingayen, St. Columban Institute in Labrador, and Domalandan Center Elementary School in Lingayen, Pangasinan. Data were gathered using a researcher-developed questionnaire and analyzed using frequency, percentage, weighted average, and correlation analyses. Findings revealed that most ICT teachers possessed bachelor's degrees, high self-rated ICT competency, relevant ICT training, and access to basic instructional gadgets such as laptops, smartphones, desktops, and projectors. Intermediate-grade learners demonstrated a high level of ICT performance, particularly in basic computer operations and use of productivity tools. Teacher ICT competency, relevant ICT training, and gadget use were significantly and positively related to learner ICT performance, whereas educational attainment and years of teaching were not. Major challenges included limited student access to devices, low digital literacy, poor connectivity, insufficient teacher training, and outdated equipment. The study concluded that practical ICT competency, sustained training, and adequate digital resources are critical to improving ICT-based learning.

Keywords: Information And Communication Technology, ICT Integration, Intermediate-Grade Learners, Teacher Competency, Digital Literacy, Student Performance

1. Introduction

Information and Communication Technology has become a defining feature of contemporary education as schools increasingly use digital tools to support instruction, assessment, communication, collaboration, and learner engagement. In the intermediate grades, ICT integration is especially important because learners are developing foundational academic competencies while also beginning to acquire digital skills needed for lifelong learning. At this stage, students are expected not only to operate devices but also to use productivity tools, search for information, collaborate digitally, observe online safety, and produce simple multimedia outputs. For this reason, ICT is no longer viewed merely as an optional instructional aid but as a necessary component of twenty-first-century teaching and learning.

The global education sector recognizes that technology can expand learning opportunities when it is used purposefully and equitably. UNESCO's Global Education Monitoring Report on technology in education emphasized that digital technology can improve access to learning

resources, support inclusion, and enrich teaching, but it must be used in line with learner needs and educational goals rather than adopted for its own sake. Similarly, UNESCO's work on digital education promotes human-centered, ethical, and equitable technologies in education, underscoring that technology should strengthen teaching and learning while protecting inclusion and quality. These perspectives are directly relevant to intermediate-grade ICT instruction because technology integration must be accompanied by teacher readiness, adequate devices, learner support, and appropriate pedagogy.

In the uploaded study, ICT integration was examined through the ICT teacher profiles, the ICT performance of intermediate-grade learners, the relationship between teacher profiles and learner performance, and the problems encountered during implementation. The study involved 150 ICT teachers from St. Columban College in Lingayen, St. Columban Institute in Labrador, and Domalandan Center Elementary School in Lingayen, Pangasinan. It used a descriptive-correlational research design to determine how teacher-related factors, such as educational attainment, ICT competency, teaching experience, relevant ICT training, and gadgets used, were associated with learner ICT performance. This focus is important because effective ICT integration depends not only on the presence of technology but also on teachers' ability to use it meaningfully in instruction.

Teacher competency remains a critical factor in ICT-based learning. The World Bank notes that digital technologies in education can support personalized learning, real-time feedback, virtual tutoring, and improved teaching support, but these benefits depend on foundational digital skills, connectivity, and implementation capacity. In classroom practice, this means that teachers need both technical skills and pedagogical judgment. They must know how to select appropriate tools, design ICT-based activities, guide learners in responsible use, troubleshoot basic issues, and align technology with learning objectives. Without sufficient teacher preparation, ICT may become a superficial classroom feature rather than a tool for deeper learning.

The study's emphasis on the teacher profile is therefore justified. Educational attainment and years of teaching may indicate professional experience, but ICT-specific competency, training, and access to devices are likely to influence how effectively teachers integrate technology into lessons. The uploaded thesis reported that teachers generally had high ICT competency and commonly used laptops, smartphones, desktop computers, and projectors. However, access to more advanced tools, such as interactive whiteboards, was limited. This condition reflects a common challenge in many schools: basic digital tools may be available, but advanced infrastructure and sustained technical support may still be insufficient. Thus, ICT integration must be understood as a combination of teacher capability, institutional support, and learner access.

Learner ICT performance is another essential concern. Intermediate-grade learners may be capable of basic computer operations and use of productivity tools, but they still need support in higher-level digital skills such as information evaluation, safe online behavior, digital collaboration, multimedia creation, and basic coding. The study found that intermediate-grade learners showed a high overall level of ICT performance, with stronger ratings in basic computer operations and productivity tools, while digital collaboration and multimedia or coding skills received comparatively lower ratings. This suggests that learners may be comfortable with routine digital tasks but require richer learning experiences that promote creativity, collaboration, digital citizenship, and problem-solving.

The relationship between teacher profile and learner ICT performance also deserves careful examination. The uploaded study found that teacher ICT competency, relevant ICT training, and gadget use were significantly and positively related to learners' ICT performance, whereas educational attainment and years of teaching were not. This indicates that practical digital skills and continuous professional development may be more influential than tenure or academic credentials alone in improving ICT learning outcomes. Such findings support the need

for schools to prioritize hands-on ICT training, peer coaching, technology-supported lesson planning, and access to updated instructional devices.

Despite its benefits, ICT integration continues to face barriers. The study identified student-related problems, including limited access to personal devices, low digital literacy, poor internet connectivity, limited engagement, and distractions. Teacher-related problems included insufficient ICT training, outdated equipment, limited technical support, time constraints, and difficulty adapting to new technologies. These issues show that ICT integration is both a pedagogical and equity concern. If learners lack devices or connectivity, and if teachers lack training or updated equipment, the promise of ICT-enhanced learning cannot be fully realized.

Accordingly, this study determined the impact of Information and Communication Technology on learning in intermediate grades. Specifically, it described the profile of ICT teachers, assessed learners' ICT performance, examined the relationship between teacher profiles and learner performance, identified problems encountered in ICT integration, and proposed interventions to improve performance. By focusing on intermediate-grade ICT instruction in selected schools in Pangasinan, the study contributes localized evidence that may guide teacher development, infrastructure planning, learner support programs, and school-based ICT improvement initiatives.

2. Method

2.1 Research Design

The study employed a descriptive-correlational research design to determine the impact of Information and Communication Technology on learning among intermediate-grade learners. The descriptive component described the profile of ICT teachers in terms of highest educational attainment, ICT competency, years of teaching experience, relevant ICT training attended, and the gadgets used for ICT instruction. It was also used to determine the level of ICT performance of intermediate-grade learners and to identify the problems encountered by teachers in ICT integration, particularly student-related and teacher-related challenges. The correlational component was applied to examine whether significant relationships existed between teacher profile variables and learners' ICT performance. This design was appropriate because the study sought to describe current ICT teaching practices and learner performance while determining the degree of association between teacher-related factors and student outcomes without manipulating any variables. Through this approach, the study generated empirical evidence on how teacher competency, professional training, and access to instructional gadgets were related to ICT learning performance among intermediate-grade learners.

2.2 Participants

The study comprised 150 ICT teachers from three selected educational institutions in Pangasinan: St. Columban College in Lingayen, St. Columban Institute in Labrador, and Domalandan Center Elementary School in Lingayen. These teachers were selected because they were directly involved in teaching Information and Communication Technology or ICT-integrated subjects at the intermediate-grade level, particularly Grades 4, 5, and 6. Stratified random sampling was employed to ensure fair and proportionate representation from the participating schools. The respondents served as the primary sources of data on teacher profile, ICT competency, teaching experience, ICT-related training, gadgets used for instruction, learner ICT performance, and problems encountered in ICT integration. Their responses were essential in determining how teacher-related factors were associated with the ICT performance of intermediate-grade learners. This participant profile was appropriate because the study focused on teachers' instructional roles in technology-based learning and on the conditions that support or hinder effective ICT integration in intermediate-grade classrooms.

2.3 Instrumentation

The study used a researcher-developed questionnaire as the primary instrument to collect data on ICT integration and learning in the intermediate grades. The instrument was developed to align with the study's objectives and organized into three major parts. The first part gathered data on ICT teachers' highest educational attainment, ICT competency, years of teaching experience, relevant ICT training attended, and the gadgets used for instruction. The second part assessed the level of ICT performance of intermediate-grade learners through indicators such as basic computer operations, use of productivity tools, internet research and information use, online safety and responsible behavior, digital collaboration, and basic multimedia or coding skills. The third part identified the problems encountered by teachers in integrating ICT, particularly student-related problems such as lack of access to personal devices, low digital literacy, poor internet connectivity, limited engagement, and short attention span, as well as teacher-related problems such as insufficient ICT training, lack of updated equipment, limited technical support, time constraints, and difficulty adapting to new technologies. The questionnaire used checklist items and Likert-scale statements to generate quantifiable responses. To ensure validity, the instrument was reviewed by experts in education, ICT, and research, and a pilot test was conducted among respondents who were not part of the final sample. Necessary revisions were made to improve clarity, relevance, and reliability before full administration.

2.4 Data Analysis

The data gathered from the researcher-designed questionnaire were analyzed using descriptive and inferential statistical procedures aligned with the study's objectives. Frequency counts and percentages were used to describe the profile of ICT teachers in terms of highest educational attainment, ICT competency, years of teaching experience, relevant ICT training attended, and gadgets used for ICT instruction. A weighted average was used to determine the level of ICT performance of intermediate-grade learners in areas such as basic computer operations, productivity tool use, internet research, online safety, digital collaboration, and multimedia or coding skills. The same procedure was used to assess the seriousness of student-related and teacher-related problems encountered in ICT integration. To determine the relationship between teacher profile variables and learners' ICT performance, a correlation analysis was conducted, focusing on ICT competency, relevant training, gadget use, educational attainment, and teaching experience. The results were interpreted using prescribed descriptive scales and tested at the 0.05 level of significance. Through these statistical procedures, the study identified the teacher-related factors significantly associated with learner ICT performance and provided an empirical basis for proposing intervention measures to improve ICT integration in intermediate-grade classrooms.

3 Results

The results showed that the ICT teachers were generally academically qualified and had sufficient teaching experience to support ICT integration in intermediate-grade classrooms. Most respondents held a bachelor's degree: 95 teachers, or 63.3%, were in this category, while 30 teachers, or 20%, were pursuing a master's degree, and 20 teachers, or 13.3%, had already completed a master's degree. In terms of teaching experience, the largest group had 6–10 years of experience, comprising 60 teachers (40%), followed by 35 teachers (23.3%) with 11–15 years of experience. These findings indicate that the respondents had an adequate professional foundation for classroom instruction, although further graduate education and advanced ICT specialization may still strengthen their instructional capacity.

The study further revealed that ICT teachers generally perceived themselves as highly competent in using and integrating ICT in instruction. The mean ICT competency rating was 4.00, indicating a high level of competence. Specifically, 70 teachers (46.7%) rated themselves as

highly competent, while 45 (30%) rated themselves as very highly competent. In terms of professional development, 110 teachers (73.3%) had attended basic ICT training, while 35 teachers (23.3%) had attended advanced ICT training. These findings suggest that most teachers had received ICT-related training and had practical confidence in their technology use. However, the lower percentage of teachers with advanced training underscores the need for deeper, more specialized professional development.

Regarding instructional gadgets, laptops were the most commonly used device, with 145 teachers (96.7%) reporting their use, followed by smartphones (80%), projectors or televisions (70%), desktop computers (53.3%), and tablets (40%). Interactive whiteboards were the least used, with only 25 teachers, or 16.7%, reporting access to this tool. These results show that teachers had access to basic ICT devices necessary for classroom instruction, but access to advanced digital tools remained limited. This suggests that while ICT integration was already in place, the modernization of classroom technology still required stronger institutional support and greater infrastructure investment.

The level of ICT performance among intermediate-grade learners was rated high, with an overall weighted mean of 3.98. Learners performed very highly in basic computer operations, with an average weighted mean of 4.36, and in the use of productivity tools such as word processing and presentation software, with an average weighted mean of 4.22. They also obtained high ratings in internet research and information use, online safety and responsible behavior, digital collaboration, and basic multimedia or coding skills. However, digital collaboration and multimedia or coding skills received lower ratings than basic computer operations and productivity tool use. This indicates that learners were more proficient in basic ICT tasks but still needed enrichment in higher-order digital skills such as collaboration, creative production, and coding.

Correlation results showed that teacher ICT competency, relevant ICT training, and gadgets used in teaching were significantly and positively related to learners' ICT performance. ICT competency had the strongest relationship with learner performance, with an r -value of 0.532 and a p -value of 0.000. Relevant ICT training was also significantly related, with an r -value of 0.415 and a p -value of 0.002, while gadgets used in teaching showed a significant weak-to-moderate relationship, with an r -value of 0.361 and a p -value of 0.005. In contrast, the highest educational attainment and years of teaching experience showed no significant relationship with learners' ICT performance. The study also found serious ICT integration problems, including limited student access to personal devices, low digital literacy, poor internet connectivity, insufficient teacher ICT training, outdated equipment, limited technical support, time constraints, and difficulty adapting to new technologies. Overall, the findings indicate that practical ICT competency, continuous training, and adequate technology access are more influential in improving learner ICT performance than academic credentials or teaching tenure alone.

4. Discussion

The finding that ICT teachers generally possessed high ICT competency supports the central role of teacher digital readiness in effective technology integration. In the study, teachers reported high ICT competency, and most had attended basic or advanced ICT training, suggesting that they had foundational skills for using digital tools in instruction. This result is consistent with UNESCO's position that technology in education must be guided by educational purpose, teacher capacity, and learner needs rather than by technology use alone. UNESCO's 2023 Global Education Monitoring Report emphasizes that digital technology can support learning, but its value depends on appropriate, equitable, and evidence-based use. Therefore, the high level of ICT competency among teachers in the present study is an important enabling factor for meaningful ICT integration.

The high level of ICT performance among intermediate-grade learners further indicates that technology integration has contributed positively to learners' digital literacy. Learners

performed very well in basic computer operations and productivity tools, and showed strong performance in internet research, online safety, digital collaboration, and multimedia or coding skills. These results suggest that learners had already developed essential operational and productivity-based ICT skills, although higher-order digital competencies still require further enrichment. The World Bank notes that digital skills are increasingly essential for students to thrive in school and work, which supports the importance of strengthening ICT learning at the intermediate level. In this context, the study's findings show that ICT instruction can equip learners with the practical digital competencies needed for current academic tasks and future learning demands.

The significant positive relationship between teacher ICT competency and learner ICT performance confirms that digitally capable teachers are more likely to support stronger ICT learning outcomes. The study found that ICT competency had the strongest relationship with learner performance, followed by relevant ICT training and gadget use. This means that practical digital knowledge and continuous professional development are more influential than educational attainment or teaching experience alone. The OECD reported that many education systems have invested in guidance and professional learning to strengthen teachers' capacity for digital education, recognizing that teacher preparation is critical to effective use of digital resources. Thus, the present findings reinforce the need for regular, hands-on, and competency-based ICT training for teachers.

The significant relationship between gadget use and learner ICT performance also highlights the importance of accessible instructional technology. In the study, laptops, smartphones, desktops, and projectors were commonly used, while interactive whiteboards were less available. This suggests that teachers had access to basic digital tools but limited access to more advanced classroom technologies. The World Bank explains that digital technologies can enhance teaching, support learners, and strengthen equitable and innovative learning systems when implemented effectively. However, the benefits of ICT depend on adequate infrastructure, connectivity, and instructional support. Therefore, the study's findings imply that schools should not only train teachers but also provide sufficient, up-to-date ICT equipment to ensure that technology-enhanced instruction is consistent, interactive, and inclusive.

Finally, the serious student-related and teacher-related problems identified in the study show that ICT integration remains constrained by equity and capacity issues. Student-related problems included lack of access to personal devices, low digital literacy, poor internet connectivity, limited engagement, and distractions. Teacher-related problems included insufficient ICT training, outdated equipment, limited technical support, time constraints, and difficulty adapting to new technologies. These findings are consistent with UNESCO's warning that technology can widen inequalities when access and support are uneven. The proposed interventions should therefore prioritize device access, improved connectivity, updated school equipment, technical support, advanced teacher training, and structured ICT-based learning activities. Overall, the study confirms that ICT can improve learning in the intermediate grades, but its impact depends on teacher competency, sustained training, sufficient digital tools, and systemic support.

References

- Organisation for Economic Co-operation and Development. (2025). *Using digital resources for learning*. OECD Publishing.
Retrieved from: https://www.oecd.org/en/publications/using-digital-resources-for-learning_eb9453f3-en.html

United Nations Educational, Scientific and Cultural Organization. (2023). *Technology in education: A tool on whose terms? Global Education Monitoring Report 2023*. UNESCO. Retrieved from: <https://www.unesco.org/gem-report/en/publication/technology>

United Nations Educational, Scientific and Cultural Organization. (n.d.). *AI and technologies in education*. UNESCO. Retrieved from: <https://www.unesco.org/en/digital-education>

World Bank Group. (n.d.). *Digital technologies in education*. Retrieved from: <https://www.worldbank.org/ext/en/topic/education/digital-technologies-in-education>