

# ICT Skills and Academic Achievement: A Correlational Study Among Elementary Pupils in Grade 4 to 6 at Cabantao Elementary School

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## ABSTRACT

This study examined the level of Information and Communication Technology (ICT) skills and academic achievement among Grades 4 to 6 pupils at Mangagoy Central School, as well as the relationship between these two variables. Five domains of ICT skills were assessed—Computer and Device Operation, Internet and Online Safety, Digital Communication and Collaboration, Information Searching and Evaluation, and Basic Software Use—and their correlation with performance in Filipino, English, Mathematics, Science, and Araling Panlipunan was analyzed.

Findings revealed that pupils demonstrated an overall average level of ICT competence, with the highest proficiency in Information Searching and Evaluation and the lowest in Basic Software Use. Academic performance was generally satisfactory to very satisfactory, with Filipino emerging as the strongest subject across grade levels. Statistical analyses indicated a significant positive correlation between ICT skills and academic achievement in all core subjects, with Basic Software Use showing the strongest link to Science performance.

The study concluded that while pupils possess moderate ICT competence, structured and inclusive ICT instruction is essential within the basic education curriculum. Enhanced ICT skills were found to contribute positively to academic outcomes, underscoring the importance of integrating technology into classroom learning. To address this, the study proposed Project DigiLEAP (Digital Learning Enhancement and Advancement Program), a school-wide initiative to strengthen digital literacy and support academic performance. Recommendations include integrating ICT across subject areas, continuous teacher training, improved access to technological resources, and fostering home-school partnerships. Future research may explore longitudinal trends, teacher readiness, parental support, and infrastructure factors influencing ICT proficiency.

**Keywords:** *Information and Communication Technology (ICT) Skills, Academic Achievement, Correlational Study, Elementary Pupils, Digital Literacy, Educational Technology, ICT Integration in Education, Learning Performance, Grade 4 to Grade 6 Learners, Cabantao Elementary School*

## INTRODUCTION

In today's digital age, Information and Communication Technology (ICT) has become an essential component of education. As schools integrate technology into their curricula, the development of ICT skills among students has gained significant importance (Voogt & Knezek, 2018; UNESCO, 2022). These skills not only enhance academic learning but also foster digital literacy, preparing pupils for future educational and professional pursuits. Understanding the relationship between ICT proficiency and academic achievement is crucial for educators, policymakers, and stakeholders aiming to optimize learning outcomes.

Furthermore, the integration of ICT tools, such as educational software, online resources, and collaborative platforms, has been shown to diversify teaching methodologies and enhance student engagement. Studies have indicated that interactive and multimedia-rich learning environments can cater to diverse learning styles, leading to improved comprehension and retention of information (Wang et al., 2021). By providing access to vast repositories of knowledge and facilitating real-time communication, ICT empowers students to become active participants in their learning process, fostering critical thinking and problem-solving skills.

Moreover, the digital divide, which refers to the gap between those who have access to ICT and those who do not, presents a significant challenge in ensuring equitable educational outcomes. Research consistently highlights that socioeconomic disparities and geographical location can influence students' access to technology and their subsequent ICT proficiency (Selwyn, 2016). Addressing this divide through targeted interventions, such as providing affordable internet access, distributing digital devices, and offering ICT training to teachers and students, is essential for promoting inclusive and equitable education.

International bodies like the OECD and the World Economic Forum (WEF) consistently highlight a growing mismatch between the basic ICT competencies taught in schools and the advanced digital literacy, critical thinking, and problem-solving skills demanded by the rapidly evolving 21st-century workforce (OECD, 2019; WEF, 2020). Furthermore, the international discussion has moved beyond the simple digital divide of access to the more nuanced divide of effective use, where even pupils with devices may lack the necessary skills to truly leverage technology for academic gain—a disparity particularly pronounced in public and underserved schools globally (UNESCO, 2022). This situation creates a substantial void in the global knowledge base, as research from organizations like the IEA's ICILS often focuses on older students, leaving a critical gap concerning the foundational impact of early ICT skills on elementary pupils. Therefore, understanding the relationship between ICT skills and academic achievement in foundational education is not just a local concern; it is a vital step toward equipping future citizens to compete in the global economy and providing the context-specific data needed for evidence-based policy making worldwide.

Finally, beyond academic achievement, ICT skills are increasingly vital for navigating the modern workforce. Employers across various sectors prioritize candidates with strong digital literacy and technical competencies. As such, educational institutions have a responsibility to equip students with the necessary ICT skills to thrive in a rapidly evolving digital economy. Integrating coding, data analysis, and digital communication into the curriculum not only enhances students' employability but also fosters innovation

and entrepreneurship (OECD, 2019). Therefore, the development of ICT proficiency should be viewed as a long-term investment in students' future success and societal progress.

Cabantao Elementary School, like many educational institutions, has embraced the use of technology in its classrooms. From interactive learning applications to research tasks using the internet, pupils are regularly exposed to digital tools. However, the extent to which these ICT skills influence academic performance remains largely unexplored. While previous studies have investigated ICT's impact on secondary and tertiary education (Fraillon et al., 2019; Lei, 2010), there is a noticeable gap in research concerning its effect on elementary pupils, particularly in public school settings. This study seeks to address this gap by examining the correlation between ICT skills and the academic achievement of Grade 4-6 pupils at Cabantao Elementary School.

This research will assess pupils' ICT competencies through a structured questionnaire, focusing on areas such as computer and device operation, internet and online safety, digital communication and collaboration, information searching and evaluation, and basic software use. Academic achievement will be measured using pupils' grades in core subjects: Math, English, and Science. By analyzing the relationship between these variables, the study aims to provide valuable insights into the role of ICT skills in shaping academic success.

Furthermore, the findings of this research can serve as a basis for the development of targeted interventions and technology-driven educational strategies. With the growing reliance on digital tools in both learning and everyday life, promoting ICT literacy in elementary education is not only beneficial but essential.

### **Review of Related Literature and Studies**

Research has consistently shown a positive correlation between ICT skills and academic achievement. According to Fraillon et al. (2019), students with proficient digital literacy tend to excel academically, particularly in subjects such as mathematics and science. This finding is supported by studies that highlight how ICT integration enhances cognitive skills. For instance, Lei (2010) demonstrated that integrating ICT into learning enhances students' problem-solving abilities, critical thinking, and information management. These cognitive skills are crucial for academic success across various disciplines.

Voogt and Knezek (2018) further emphasize that digital competence fosters independent learning, especially in technology-rich environments. In such settings, students can leverage ICT tools to take ownership of their learning, explore topics in-depth, and work at their own pace. Early exposure to educational tools and applications provides learners with essential digital skills that are increasingly necessary not only for academic success but also for lifelong learning in a digital society. Moreover, the effective use of ICT in schools has been linked to increased motivation and engagement, leading to better learning outcomes (Ertmer & Ottenbreit-Leftwich, 2013). When students are engaged and motivated, they are more likely to invest time and effort in their studies, resulting in improved academic performance.

Moreover, research has explored the role of ICT in fostering collaborative learning environments. Studies by Johnson et al. (2021) indicate that the use of online platforms and digital tools enables students to work together on projects, share resources, and provide peer feedback, ultimately enhancing their understanding of the subject matter. This collaborative aspect of ICT integration not only improves academic outcomes but also develops crucial teamwork and communication skills essential for future success in both academic and professional settings (Lai & Hong, 2015). The ability to collaborate effectively is a key skill in the 21st century, and ICT provides valuable tools to facilitate this process.

### **Definition and Dimensions of ICT Skills**

#### **1. Computer and Device Operation**

Computer and device operation refers to the ability to efficiently use computers, tablets, and other digital tools for various academic and personal tasks. This includes basic functions such as turning on and off equipment, managing files, installing software, troubleshooting basic problems, and operating peripheral devices like printers and scanners. According to UNESCO (2018), these foundational computer operation skills serve as the cornerstone of digital literacy, enabling learners to participate meaningfully in technology-driven educational environments. Without mastery of basic computer functions, students may struggle to engage with digital learning materials and online educational platforms. Furthermore, Almerich et al. (2005) found that students who possess higher levels of computer operation competence exhibit better performance in ICT-integrated activities and academic tasks. The ability to use digital devices effectively allows learners to focus on higher-order cognitive tasks—such as research and content creation—thereby directly influencing their academic achievement.

#### **2. Internet and Online Safety**

Internet and online safety encompass the knowledge and skills needed to navigate the online world responsibly and ethically. This includes understanding how to safeguard personal information, recognize and avoid online scams or phishing attempts, and respond appropriately to cyberbullying or inappropriate content. The European Commission's Digital Competence Framework (DigComp, 2022) describes online safety as the capacity to protect one's digital identity, ensure data privacy, and act responsibly in digital interactions. Research by Livingstone and Helsper (2010) emphasizes that digital safety awareness is crucial in fostering responsible digital citizenship, especially among young learners. Students who are aware of online risks are more likely to engage in secure digital practices, use technology constructively for learning, and exhibit higher engagement in online learning environments. Likewise, Ng (2012) found that awareness of online safety protocols correlates with students' confidence and readiness to participate in digital education, ultimately supporting their overall academic success.

#### **3. Digital Communication and Collaboration**

Digital communication and collaboration refer to the ability to use technology tools—such as email, chat applications, video conferencing platforms, and shared digital workspaces—to interact, exchange information, and work collaboratively with others. In 21st-century education, this competency is

increasingly important as classrooms become more connected and collaborative. According to Voogt and Roblin (2012), digital communication and collaboration are among the core competencies necessary for learners to thrive in modern, technology-rich learning environments. Similarly, Redecker and Punie (2017) highlight that students who effectively collaborate using digital tools tend to develop stronger problem-solving and critical-thinking skills, which are vital for academic success. Moreover, Dooly (2008) notes that online collaboration fosters intercultural understanding and teamwork, helping students adapt to globalized communication contexts. Through digital collaboration, learners not only share knowledge but also co-construct understanding, resulting in improved academic performance and engagement.

#### 4. Information Searching and Evaluation

Information searching and evaluation involve the ability to locate, retrieve, analyze, and assess digital information critically for credibility, relevance, and accuracy. In the digital age, the vast amount of online information requires learners to distinguish between reliable and unreliable sources. UNESCO (2013) describes information literacy—which includes searching and evaluation—as an essential skill that empowers learners to become independent, lifelong learners capable of making informed decisions. Empirical evidence supports this view: Aesaert and van Braak (2014) found that students who demonstrate higher proficiency in information evaluation also show greater academic achievement, as they are able to apply relevant and accurate information to their studies. Julien and Barker (2009) further argue that information literacy promotes critical thinking, enabling learners to synthesize and communicate ideas effectively. Thus, students with strong information searching and evaluation skills not only perform better academically but also develop higher levels of autonomy and analytical ability.

#### 5. Basic Software Use

Basic software use refers to the ability to operate common software applications such as word processors, spreadsheets, and presentation tools—examples include Microsoft Office (Word, Excel, PowerPoint) and Google Workspace applications (Docs, Sheets, Slides). These tools are essential for producing academic outputs, organizing data, and presenting information effectively. Almerich et al. (2005) emphasized that proficiency in basic software applications supports the development of key academic and professional competencies, as it allows learners to express ideas clearly and complete digital tasks efficiently. Similarly, Ertmer et al. (2012) found that students who demonstrate greater competence in educational software tend to be more engaged and perform better in technology-enhanced learning environments. The ability to manipulate software tools not only boosts productivity but also increases students' motivation and confidence in performing academic tasks. As Buabeng-Andoh (2012) notes, teachers and students who are proficient in software use are more likely to integrate ICT effectively into the learning process, leading to improved educational outcomes.

Overall, numerous empirical studies confirm that ICT skills are strong predictors of academic achievement. Claro et al. (2012) conducted a large-scale assessment in Chile and reported that students' ICT competencies—particularly in information handling and problem solving—were positively associated with their academic outcomes. Similarly, a meta-analysis by Li et al. (2025) found a significant moderate correlation between digital literacy and student achievement across diverse contexts, confirming the

predictive value of ICT skills in educational success. These findings suggest that the integration of ICT competence in the curriculum plays a vital role in enhancing students' learning efficiency and academic performance in the 21st-century classroom.

The impact of ICT extends beyond cognitive and collaborative benefits to include the development of metacognitive skills. According to findings by Zimmerman and Schunk (2011), students who effectively use ICT tools for learning often demonstrate improved self-regulation and the ability to monitor their own learning progress. Access to digital resources and feedback mechanisms allows students to identify their strengths and weaknesses, adapt their learning strategies, and take greater ownership of their educational journey (Hattie, 2012). This self-directed learning is a crucial factor in academic achievement, as it empowers students to become active agents in their own learning. The integration of ICT in education can help to personalize the learning experience, catering to the diverse needs of students. Research by Means et al. (2013) suggests that adaptive learning technologies and digital content can be tailored to individual student learning styles and paces, leading to more effective and engaging learning. This personalized approach can address learning gaps, provide targeted support, and ultimately contribute to improved academic achievement across a wider range of learners (Dede, 2010). By providing customized learning experiences, ICT can help to ensure that all students have the opportunity to succeed, regardless of their individual learning needs.

The growing integration of technology into education has encouraged researchers worldwide to explore how Information and Communication Technology (ICT) skills influence students' academic achievement. Numerous international and local quantitative studies have demonstrated that ICT skills—encompassing competencies in information handling, communication, content creation, safety, and problem solving—serve as significant predictors of students' learning outcomes. The consensus across many findings suggests that students who possess higher ICT competence are more likely to perform better academically, particularly when technology is used purposefully and in alignment with instructional goals.

### **International and Local Studies**

A comprehensive international meta-analysis by Li, Zhang, and Zhao (2025) reported a moderate positive correlation between digital literacy and academic achievement across various levels of education. The study synthesized data from multiple quantitative investigations and found that students with advanced digital skills tend to outperform their peers academically. The researchers also identified moderating factors such as age, subject area, and the method of ICT assessment. For example, performance-based measures of ICT competence yielded stronger relationships with academic outcomes compared to self-reported measures, underscoring the importance of accurately evaluating students' actual digital capabilities.

Claro et al. (2012) conducted one of the most influential large-scale quantitative studies linking ICT skills to academic performance. Their research in Chile assessed 21st-century ICT competencies—including information management, communication, and problem solving—through performance-based tasks. Results showed a significant positive association between students' ICT skills and their academic achievement, particularly in reading, mathematics, and science. This study demonstrated that digital competence contributes to the development of analytical and critical thinking abilities, which, in turn,

enhance overall academic performance. Claro and colleagues also highlighted that ICT skills are multidimensional, suggesting that educational programs should not only focus on basic computer literacy but also on higher-order digital problem solving.

Similarly, Courtney, Gong, and Chen (2022) analyzed data from a large international dataset and found that purposeful ICT use for academic activities—such as conducting research, completing assignments, and collaborating online—had a positive effect on students' grades. In contrast, excessive or entertainment-oriented ICT use showed weak or even negative correlations with academic performance. Their findings underscore the idea that the quality and purpose of ICT engagement, rather than mere frequency of use, determine its educational value. This distinction has guided modern pedagogical frameworks that encourage the development of critical and productive ICT use among students.

The European Commission's Joint Research Centre (2017) also emphasized this multidimensional nature of ICT competence through the Digital Competence Framework for Citizens (DigComp 2.1), identifying five key areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem solving. Empirical research guided by this framework consistently shows that these dimensions, when fostered through instruction, contribute to improved academic outcomes (van Laar et al., 2020). The DigComp model's influence has extended beyond Europe, serving as a benchmark for ICT assessment and curriculum integration in many educational systems worldwide.

Beyond large-scale international studies, several local Philippine studies have echoed similar trends, though often moderated by contextual factors such as access, teacher competence, and infrastructure. For instance, local research conducted among secondary students in public schools revealed that ICT proficiency—particularly in information literacy and communication—was positively correlated with students' grade point averages (Acuña & Valdez, 2022). Students who used ICT tools for research, presentation, and collaboration performed better academically compared to those who used technology mainly for recreation. Conversely, some studies in rural settings found only modest or nonsignificant correlations between ICT use and academic performance, often attributing the results to limited internet access, lack of ICT facilities, and insufficient teacher training (Manalo & Arguelles, 2021).

UNESCO's (2023) country case report on technology in Philippine education further supports these findings, noting that disparities in digital access and teacher preparedness significantly affect how ICT skills translate into student learning gains. Schools with adequate infrastructure and structured ICT integration programs tend to show stronger evidence of ICT's positive impact on learning outcomes. These findings underscore the importance of equitable access and teacher training in ensuring that ICT skills serve as effective predictors of achievement rather than mere indicators of exposure.

Overall, both international and local literature affirm that ICT skills are significant predictors of academic achievement, although the strength of the relationship varies across contexts. International studies consistently reveal that students with higher ICT competencies—especially in problem solving and information management—achieve better academic results. Local studies in the Philippines show similar trends but highlight the moderating influence of infrastructure, socioeconomic status, and teacher readiness. Collectively, these findings reinforce the need to develop ICT-integrated learning environments that

promote purposeful, safe, and skill-based technology use. For this reason, the present study investigates the relationship between ICT skills and academic achievement among Grade 5 pupils, contributing to the growing body of evidence that ICT competence is an essential component of 21st-century learning success.

At the elementary level, integrating ICT tools has demonstrated positive effects on learning experiences. UNESCO (2022) emphasizes that ICT can support foundational skills in reading, writing, and mathematics. For instance, educational apps and online learning platforms provide interactive and personalized learning experiences, which can enhance student comprehension. These tools can make learning more engaging and effective for young learners. Additionally, research by Ertmer and Ottenbreit-Leftwich (2013) highlights the importance of teacher competence in using ICT tools, as effective integration is closely linked to teacher confidence and skill level. Teachers who are well-trained and confident in their ability to use ICT can create more effective and engaging learning experiences for their students.

However, the accessibility of digital resources remains a significant challenge in some public schools, particularly in rural areas. Many schools lack sufficient ICT infrastructure, limiting pupils' opportunities to develop essential digital skills (UNESCO, 2022). This lack of access can create a digital divide, where some students have significantly more opportunities to develop ICT skills than others. Additionally, disparities in ICT competence may arise due to differences in access to technology at home. Addressing these gaps requires targeted interventions to ensure equitable learning opportunities for all students. These interventions may include providing additional resources to under-resourced schools, offering training for teachers, and providing students with access to technology both in and out of the classroom.

Furthermore, research indicates that ICT integration can foster creativity and problem-solving skills among elementary students. A study by Bers (2018) explored the use of coding and robotics in early childhood education, finding that these activities not only develop computational thinking but also encourage innovation and imaginative thinking. Interactive simulations and digital storytelling tools also provide platforms for students to express themselves and explore concepts in engaging ways, leading to deeper understanding and retention (Resnick, 2017). These creative and problem-solving skills are essential for success in the 21st century, and ICT can play a key role in developing them.

Addressing the digital divide requires a multi-faceted approach involving government initiatives, school-level planning, and community engagement. According to Warschauer (2003), successful ICT integration in underserved communities necessitates not only providing hardware and software but also ensuring adequate technical support, teacher training, and relevant digital content. It's not enough to simply provide technology; it must be accompanied by the necessary support and resources to ensure that it is used effectively. Partnerships between schools and local organizations can also play a crucial role in bridging the gap by providing access to resources and expertise (van Dijk, 2012). These partnerships can help to provide students with access to technology and support that they might not otherwise have.

Moreover, the role of parents and caregivers in supporting children's digital literacy development at the elementary level is increasingly recognized. Livingstone and Helsper (2007) emphasize the importance of parental guidance and involvement in shaping children's online experiences and fostering

responsible technology use. Parents can play a significant role in helping their children to develop responsible online habits and to use technology in a safe and effective manner. Providing parents with resources and training on how to support their children's learning with ICT can significantly enhance the effectiveness of school-based interventions and promote a more holistic approach to digital education (Selwyn, 2010). When parents and schools work together, they can create a more supportive and effective learning environment for students.

Studies suggest that the use of ICT in core subjects like Math, English, and Science is particularly beneficial. In Math, educational applications can offer interactive problem-solving exercises that promote analytical thinking (Fraillon et al., 2019). These applications can provide students with immediate feedback and allow them to work at their own pace. In English, digital platforms provide opportunities for reading comprehension activities and language practice, leading to improved literacy (Voogt & Knezek, 2018). ICT can provide access to a wide range of reading materials and interactive exercises that can help students to improve their reading and writing skills. Meanwhile, in Science, simulations and virtual labs enhance students' understanding of complex scientific concepts (Lei, 2010). These tools can make science more engaging and interactive, helping students to develop a deeper understanding of the world around them.

Nevertheless, while the integration of ICT has been extensively studied at the secondary and tertiary levels, limited research has been conducted on its impact on elementary pupils in public schools. This is especially true in schools like Cabantao Elementary School, where access to technological resources may differ from that in urban areas. Your study aims to address this gap.

Despite the limited research specifically focused on elementary public schools, existing studies offer valuable insights. For instance, a meta-analysis by Cheung and Slavin (2013) examined the effects of educational technology on mathematics achievement in K-12 students and found positive correlations, suggesting that even basic ICT tools can be beneficial at the elementary level. This meta-analysis provides strong evidence for the potential of ICT to improve math achievement across all grade levels.

Similarly, research on early literacy interventions using technology has shown promising results in improving phonological awareness and reading fluency in young learners (National Reading Panel, 2000). While not exclusively focused on public schools or elementary grades, these findings indicate the potential of ICT to support foundational learning in these contexts. Technology can be a valuable tool for helping young learners to develop essential literacy skills.

Furthermore, the unique challenges and opportunities present in schools like Cabantao Elementary School warrant specific attention. Case studies from similar resource-constrained environments highlight the importance of context-specific ICT integration strategies. For example, studies by Unwin (2008) in developing countries emphasize the need for sustainable solutions that consider local infrastructure, teacher training, and community involvement. It's crucial to consider the specific context when implementing ICT in schools, and to ensure that solutions are sustainable and appropriate for the local environment. Exploring how low-cost or open-source technologies can be effectively utilized in such settings could provide valuable models for schools facing similar limitations. Research focusing on teacher professional development in integrating ICT within under-resourced elementary schools is also crucial to ensure effective

implementation and maximize the benefits for students (Law et al., 2010). Teachers need to be adequately trained and supported in order to effectively integrate ICT into their teaching practices.

Moving forward, there is a clear need for more research specifically investigating the impact of ICT integration on elementary pupils in public schools, particularly in diverse contexts like Cabantao Elementary School. Your study will contribute to filling this need. Such research should explore not only academic outcomes but also the development of digital literacy skills, student engagement, and the role of teachers and the community in supporting ICT adoption. Understanding the specific challenges and successes in these settings will be essential for developing effective and equitable strategies to leverage the potential of ICT for all young learners (Pelgrum, 2001)

### **Local Studies on ICT Integration in Philippine Elementary Education**

A study conducted by Tabiolo (2023) at Miputak East Central School in Dipolog City examined the effect of ICT integration on Grade III pupils' performance in Elementary Science. Utilizing a quantitative pre-test post-test experimental design with 80 respondents, the research demonstrated that incorporating ICT tools significantly enhanced students' understanding and retention of scientific concepts. This suggests that ICT can be a valuable asset in improving academic outcomes in science subjects within the Philippine context.

Research by Rana and Rana (2020) explored ICT integration in elementary mathematics education in the Philippines. The study highlighted that the use of educational software and digital resources in teaching mathematics led to improved problem-solving skills and higher achievement levels among students. The authors emphasized the necessity for adequate teacher training to maximize the benefits of ICT in the classroom, a finding that resonates with the broader literature on ICT integration.

A study focusing on Binalbagan District II investigated the effectiveness of ICT utilization concerning pupils' academic performance. Employing a descriptive research design with 60 teacher respondents from 14 public elementary schools, the findings indicated that strategic use of ICT resources positively influenced students' overall academic achievements. The study recommended continuous professional development for teachers to enhance ICT integration strategies, aligning with the need for teacher training identified in other studies.

Ertmer and Ottenbreit-Leftwich (2013) emphasized the critical role of teacher readiness and confidence in effectively integrating ICT into classrooms. Their research suggests that educators who undergo comprehensive ICT training are more likely to adopt innovative teaching methods, leading to improved academic results for students. This underscores the importance of investing in teacher professional development to maximize the benefits of ICT in education in the Philippine context as well.

Further supporting the positive impact of ICT integration in the Philippine context, a study by Castroverde and Mendoza (2019) investigated the use of blended learning approaches in a public elementary school in Laguna. Their findings revealed that combining face-to-face instruction with online resources significantly improved student engagement and academic performance across various subjects.

The study highlighted the potential of blended learning to cater to diverse learning styles and provide students with more flexible learning opportunities (Castroverde & Mendoza, 2019). This finding is particularly relevant in the context of the Philippines, where blended learning has become increasingly important.

In another local study, conducted in Cebu, researchers explored the effectiveness of using interactive whiteboards in teaching elementary mathematics. The study by Dela Cruz et al. (2021) found that the use of interactive whiteboards led to increased student participation, enhanced understanding of mathematical concepts, and improved problem-solving skills. The visual and interactive nature of the technology was identified as a key factor in its positive impact on student learning outcomes (Dela Cruz et al., 2021). This study provides further evidence for the benefits of ICT integration in Philippine elementary schools.

Moreover, a study by Santiago and Estoque (2022) examined the challenges and opportunities of ICT integration in rural elementary schools in the Philippines. Their research highlighted issues such as limited internet connectivity and lack of adequate technical support, but also showcased successful initiatives where schools creatively utilized available resources to enhance teaching and learning. The study emphasized the importance of community involvement and sustainable ICT integration strategies to overcome these challenges and maximize the benefits for students in underserved areas (Santiago & Estoque, 2022). This study is particularly relevant to your research, as it focuses on the challenges and opportunities of ICT integration in a rural setting similar to Cabantao Elementary School.

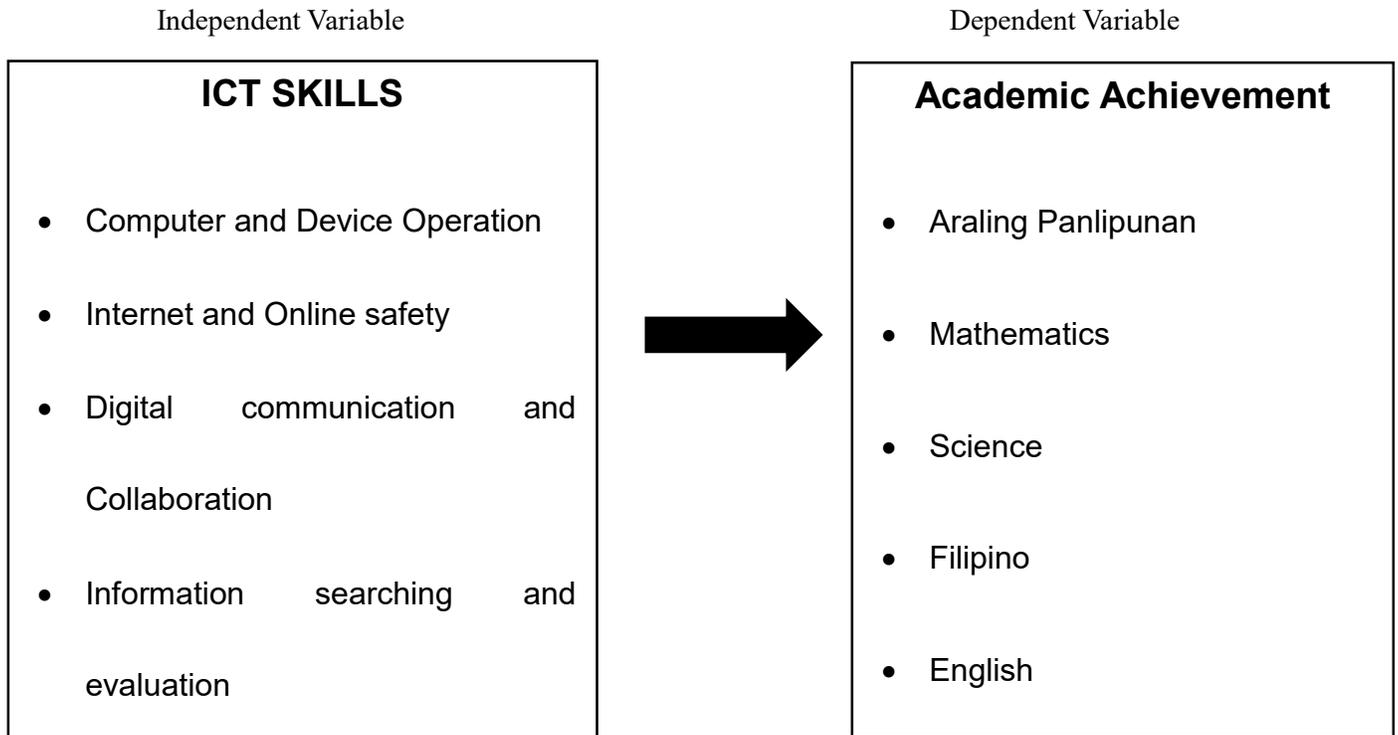
The Department of Education (DepEd) in the Philippines recognizes the importance of ICT in effective teaching. DepEd has urged teachers to devise various teaching methods that instill creativity and critical thinking among learners through ICT. Integrating ICT in both teaching and governance is seen as pivotal for delivering quality, accessible, and relevant basic education to Filipino students. This policy underscores the importance of your research in the Philippine context.

### **Theoretical Framework**

This study is anchored on the premise that information and communication technology (ICT) skills can significantly influence students' academic achievement. According to Fraillon et al. (2019), digital competence is increasingly recognized as a critical factor in students' academic success, particularly in core subjects like Math, English, and Science. Voogt and Knezek (2018) further emphasize that early exposure to ICT tools fosters independent learning, problem-solving, and critical thinking, which are essential for academic growth.

In the context of elementary education, pupils' ICT skills encompass various competencies, including computer and device operation, internet and online safety, digital communication and collaboration, information searching and evaluation, and basic software use (UNESCO, 2022). These skills enable pupils to navigate digital resources effectively, participate in interactive learning experiences, and complete academic tasks more efficiently. As such, this study considers ICT skills as the independent variable influencing pupils' academic achievement.

Academic achievement, the dependent variable, will be assessed using the pupils’ grades in Math, English, and Science. These subjects are fundamental in the Philippine basic education curriculum and serve as reliable indicators of academic performance (Department of Education [DepEd], 2020). The study will employ a correlational research design to determine the strength and direction of the relationship between ICT skills and academic achievement, addressing the gap in existing literature that primarily focuses on secondary and tertiary education (Lei, 2010; Fraillon et al., 2019).



*Fig. 1 The Schematic Diagram of the Study*

**Statement of the Problem**

This study aims to determine the correlation between ICT skills and academic achievement among Grades 4 to 6 pupils at Cabantao Elementary School, School Year 2024-2025. Specifically, it seeks to answer the following questions:

1. What is the level of ICT skills of pupils in Grades 4 to 6 in terms of:
  - 1.1. Computer and Device Operation - The ability to use computers and digital devices efficiently, including managing files, software, and hardware components (UNESCO, 2018).
  - 1.2. Internet and Online Safety- The skill of navigating the internet responsibly while protecting personal data and avoiding online risks (European Commission, 2022).

- 1.3. Digital Communication and Collaboration - The capacity to communicate and work effectively with others using digital tools and platforms (Voogt & Roblin, 2012).
- 1.4. Information Searching and Evaluation - The ability to locate, assess, and use digital information critically and responsibly (UNESCO, 2013).
- 1.5. Basic Software Use - The competence to operate common applications like word processors, spreadsheets, and presentations for academic and professional tasks (Almerich et al., 2005).

2. What is the academic achievement of pupils in Grades 4 to 6 in the core Academic Subjects:

2.1 Mathematics

2.2 English

2.3 Science

2.4 Filipino

2.5 Araling Panlipunan

3. Is there a significant relationship between pupils' ICT skills and their academic achievement in the core academic subjects?
4. Are there significant differences in ICT skills and academic achievement among Grades 4, 5, and 6 pupils?
5. Based on the findings, what recommendations can be proposed to enhance ICT skill development and academic performance among pupils in Grades 4 to 6?

These research questions will guide the study in exploring the extent to which ICT skills influence academic achievement and provide actionable insights for educators, administrators, and policymakers.

### **Hypotheses**

This study will test the following null hypotheses ( $H_0$ ) and alternative hypotheses ( $H_1$ ) at a 0.05 significance level:

**$H_{01}$ :** There is no significant relationship between the ICT skills of Grades 4 to 6 pupils and their academic achievement in Math, English, and Science at the 0.05 significance level.

**$H_{11}$ :** There is a significant relationship between the ICT skills of Grades 4 to 6 pupils and their academic achievement in Math, English, and Science at the 0.05 significance level.

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## Significance of the Study

This study explores the relationship between ICT skills and academic achievement among Grade 4-6 pupils at Cabantao Elementary School. The findings will provide valuable insights into how ICT competencies contribute to students' learning experiences and overall academic performance.

Department of Education - The findings can help DepEd identify which specific ICT competencies—such as computer operation, online safety, and digital communication—most strongly predict academic performance, allowing the agency to enhance digital literacy programs in the curriculum.

School Division Superintendent-The Superintendent can use the study to develop policies and programs that support the integration of ICT in elementary education. By understanding the impact of ICT skills on academic achievement, the Superintendent can initiate system-wide improvements that enhance digital learning.

Chief Education Program Supervisors - The findings of this research will help education supervisors design capacity-building programs for teachers, ensuring they are equipped with the necessary ICT skills and pedagogical strategies to enhance student learning.

Public Schools District Supervisors- This study provides a clear assessment of ICT integration in the classroom and how it affects student achievement. Based on the results, district supervisors can recommend training programs for teachers and allocate resources to improve ICT-based learning.

School Principals - The study will help school principals develop initiatives and guidelines for improving ICT instruction in classrooms. It will also assist in evaluating the effectiveness of current ICT programs and identifying areas for enhancement.

ICT Coordinators - This study can serve as a valuable reference for ICT Coordinators in designing and implementing effective technology-based learning strategies in classrooms. The findings can help them assess current ICT initiatives, address gaps, and improve digital learning practices in schools.

Student-. This study will highlight how ICT skills contribute to academic success, encouraging students to develop digital literacy and problem-solving abilities essential for modern education and future careers.

Parents- Parents will gain insights into the importance of ICT skills in their children's education. The study may also encourage them to support their children in using technology effectively for learning at home.

Community- The research emphasizes the role of the community in supporting ICT education through partnerships, resource sharing, and advocacy. The results may encourage local stakeholders to invest in digital learning initiatives for schools.

Future Researchers - Future researchers can benefit from this study as it provides a valuable reference for understanding the relationship between ICT skills and academic achievement among elementary pupils. The findings can serve as a foundation for further studies exploring other variables such as digital attitudes, access to technology, or teacher ICT competence.

### **Limitations of the Study**

This study focuses on examining the relationship between ICT skills and academic achievement among Grade 4 to Grade 6 pupils of Cabantao Central School. However, certain limitations must be acknowledged. The scope of the study is limited to pupils in one school, which means the findings may not be fully applicable to students in different grade levels or schools with varying ICT resources.

Another limitation is that academic achievement is primarily measured through grades, which may be influenced by factors such as teacher grading systems, subject difficulty, and individual student effort. The study also does not account for external factors like internet access at home, availability of devices, parental involvement, and socio-economic background, all of which could impact both ICT skills and academic performance. Furthermore, data collection is conducted within a specific academic period, meaning the study does not track the long-term development of students' ICT skills or academic progress over multiple years.

Moreover, disparities in access to technology outside of school are not deeply examined. Some students may have more exposure to computers and the internet at home, which could provide them with an advantage over their peers. While the study acknowledges the role of ICT coordinators, it does not focus on specific teaching strategies that may influence students' ICT skill development. Despite these limitations, the study aims to provide valuable insights into the significance of ICT skills in students' academic performance, contributing to future educational strategies and improvements.

## **METHODS**

This chapter gives the impression and clear visual on how the research is conducted. It incorporates the research design, the research locale, and the subjects of the study, the instruments used, the research procedure, and the statistical treatment.

### **Research Design**

The research design for the study "ICT Skills and Academic Achievement: A Correlational Study Among Grades 4-6 Pupils of Cabantao Elementary School" is a Quantitative correlational study that aims to explore the relationship between students' ICT skills and their academic achievement. The study will examine how proficiency in information and communication technology (ICT) may influence or be associated with academic success, specifically focusing on core subjects such as Mathematics, Science, English, and Social Studies. By analyzing the relationship between these two variables, the study seeks to provide insights into whether ICT skills play a role in enhancing students' academic performance. The

findings may inform educational strategies and highlight the importance of integrating ICT into the learning process at an early educational level.

Quantitative Correlational studies are useful for identifying relationships between variables without manipulation, allowing researchers to determine the strength and direction of associations (Pallant, 2020).

### **Research Locale**

The research was conducted at Cabantao Elementary School, located in Cabantao, Rosario, Caraga, province of Agusan del Sur. This school offers complete grade levels from 1 to 6. The researcher, who is also the ICT Coordinator at this school, has chosen this locale due to direct access to the student population and the school's existing infrastructure. The researcher is familiar with the ICT facilities available to students and teachers, which will aid in assessing the ICT skills of Grade 4-6 pupils accurately.

The school's diverse student body, encompassing all grade levels, provides a comprehensive setting to explore the role of ICT skills in students' academic performance. Additionally, being part of the school community allows the researcher to observe the integration of ICT tools in day-to-day learning activities, making the school an ideal location to investigate the correlation between ICT skills and academic achievement. The findings from this research will also be particularly relevant to the local educational context, helping to improve ICT integration strategies in the school.

### **Respondents of the Study**

The respondents of this study are the 85 Grade 4 to Grade 6 pupils of Cabantao Elementary School. To determine the sample size for the study, the researcher applied Slovin's Formula. The resulting sample size are 85 respondents, which allows for an appropriate representation of the population while considering the margin of error.

### **Sampling Method**

This study employed a Stratified Random Sampling method, as introduced by Neyman (1934), to ensure that the findings are statistically valid and representative of the entire Grade 4 to Grade 6 pupil population at Cabantao Elementary School. This method was chosen because it allows the researcher to divide the population into homogeneous subgroups or strata—based on grade levels in this case—and then randomly select participants from each group. Such an approach increases the precision of the results and minimizes sampling bias, ensuring that each grade level is proportionally represented in the study. By dividing the population into distinct subgroups or strata based on grade level, the sampling process guarantees that each subgroup is appropriately represented in the sample. After dividing the population into strata, randomly select the required number of pupils from each grade level. This can be done using simple random sampling techniques, such as drawing lots, using a random number generator, or employing a random sampling tool. This approach enhances the generalizability of the results, ensuring that the study's conclusions accurately reflect the academic achievement and ICT skills across the different grade levels.

**Table 1. The Respondents of the Study**

<b>Grade Level</b>	<b>Total Population</b>	<b>Sample Size</b>	<b>Percentage</b>
Grade 4	35	28	80%
Grade 5	40	31	77.5%
Grade 6	33	26	78.8%

Table 1 presents the distribution of the respondents according to grade level. As shown, the total population of Grades 4 to 6 pupils at Cabantao Elementary School was 108. Using the stratified random sampling technique (Neyman, 1934), a total of 85 pupils were selected as participants. The sample consisted of 28 pupils from Grade 4 (80%), 31 pupils from Grade 5 (77.5%), and 26 pupils from Grade 6 (78.8%). This proportional representation ensured that each grade level was fairly included in the study, making the sample reflective of the entire population of intermediate pupils.

Using Slovens Formula, the sample size of 85 represents approximately 78.7% of the total population of 108 students.

### **Instrument of the Study**

The ICT Skills Questionnaire, adapted from the International Computer and Information Literacy Study (ICILS) 2018 Technical Report by the International Association for the Evaluation of Educational Achievement, serves as the primary data collection instrument for this study. It is designed to assess the ICT skills of Grade 4-6 pupils at Cabantao Elementary School. The questionnaire consists of five sections, each focusing on a different aspect of ICT competency:

1. **Computer and Device Operation** – Measures basic technical skills such as turning a device on and off, using input devices (mouse, keyboard, touchscreen), adjusting settings, and troubleshooting minor issues.
2. **Internet and Online Safety** – Evaluates awareness of internet connectivity, identifying safe and unsafe websites, protecting personal information, and following online safety rules.
3. **Digital Communication and Collaboration** – Assesses the ability to use email, chat, and video calls, communicate respectfully online, and share documents securely.
4. **Information Searching and Evaluation** – Examines how students search for and verify information online, including the use of keywords and checking source credibility.

5. Basic Software Use – Tests proficiency in typing, using word processors, creating presentations, saving and retrieving files, printing, and utilizing educational applications.

Each statement in the questionnaire is rated on a Likert scale (5 - Always, 4 - Often, 3 - Sometimes, 2 - Rarely, 1 - Never), allowing for a quantitative measure of ICT skills.

This structured approach ensures a comprehensive evaluation of students' ICT skills, providing valuable insights into their digital competencies and their potential impact on academic achievement.

### **Validity and Reliability**

To ensure content validity, the instrument was reviewed and evaluated by a panel of experts consisting of ICT coordinators and education professionals who assessed the questionnaire's relevance, clarity, and alignment with the ICILS framework. Their feedback was incorporated to refine the final version of the tool. A pilot test was conducted among a small group of pupils with similar characteristics as the target respondents to determine reliability. Using Cronbach's alpha, the internal consistency of the instrument was found to be 0.89, indicating a high level of reliability (George & Mallery, 2019). This confirms that the ICT Skills Questionnaire is both valid and reliable for assessing the digital competencies of elementary pupils.

### **The Research Procedure**

#### **Before Data Collection**

Prior to the conduct of the study, the researcher sought approval from the Division Office of Agusan del Sur to ensure that the research adhered to DepEd policies and ethical standards. A formal letter of request was submitted to obtain permission to administer the research instruments within Cabantao Elementary School. After securing the Division's endorsement, the researcher also requested consent from the school head to facilitate the administration of the questionnaire to Grade 4–6 pupils. The ICT Skills Questionnaire, adapted from the International Computer and Information Literacy Study (ICILS, 2018), underwent expert validation to ensure content accuracy and relevance. Revisions were made based on the suggestions of ICT coordinators and education professionals. Once validated, the researcher reproduced the instrument into sufficient copies corresponding to the total number of target respondents.

#### **During Data Collection**

After obtaining the necessary approvals, the researcher personally administered the ICT Skills Questionnaire to the respondents. The study was conducted during class hours in coordination with the advisers of Grades 4, 5, and 6 to minimize classroom disruption. The purpose of the study was clearly explained to the participants, and confidentiality of their responses was assured. The respondents were guided on how to answer the questionnaire, and adequate time was given for completion. The researcher ensured that the administration process was orderly, unbiased, and consistent across all grade levels to maintain the integrity of data collection.

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### After Data Collection

Upon completion, the researcher personally retrieved all the accomplished questionnaires using the same method of distribution to ensure accountability. The collected data were organized, tallied, and encoded in a data matrix. Frequency counts, percentages, and weighted means were computed to determine the respondents' ICT skill levels. The data were then subjected to statistical treatment and interpretation with the guidance of the research adviser and statistician. Finally, the analyzed results were used to draw conclusions and formulate recommendations regarding the relationship between ICT skills and academic achievement among Grade 4–6 pupils of Cabantao Elementary School.

### Statistical Treatment of Data

**Problem 1** To determine the level of ICT skills among Grade 4 to Grade 6 pupils, the statistical treatment for this study used the mean, standard deviation, frequency, and percentage to summarize the pupils' ICT skills. The mean will provide the average skill level, while the standard deviation will measure the variability of the scores. Frequency will identify how many pupils fall into each skill category, and percentage will express these frequencies relative to the total number of students. Together, these statistics will offer a clear overview of the trends and variations in ICT competency.

**Problem 2** To assess the academic achievement of Grade 4 to Grade 6 pupils, the Mean, Standard Deviation, Frequency, and Percentage is used to analyze and describe their academic performance.

**Problem 3** To examine the relationship between ICT skills and academic achievement, the Spearman's Rank-Order Correlation Coefficient ( $\rho$ ) was used. Since the data are not normally distributed, this non-parametric test is appropriate for measuring the strength and direction of the monotonic relationship between two variables. A significant positive  $\rho$  value indicates that as ICT skills increase, academic performance tends to improve. This method is robust for ordinal and skewed data distributions, ensuring accurate interpretation of the correlation.

**Problem 4** To determine whether there are significant differences in ICT skills and academic achievement among Grade 4, Grade 5, and Grade 6 pupils, the Kruskal-Wallis H Test was utilized. This non-parametric alternative to one-way ANOVA is suitable for comparing the medians of more than two independent groups when the assumption of normality is not met. If the test yields a significant result, post hoc pairwise comparisons (such as Dunn's test with Bonferroni correction) may be conducted to identify

which specific grade levels differ. This analysis allows for a meaningful interpretation of group differences in the context of non-normal data.

### RESULTS AND DISCUSSION

This chapter presents, analyzes, and interprets the data gathered in the study. It provides a detailed discussion of the findings to highlight the accuracy, clarity, and relevance of the results. The interpretation is anchored on the study's objectives and research questions, offering insights into the level of ICT skills among Grades 4 to 6 pupils and their relationship to academic achievement.

**Problem 1.** What is the level of ICT skills of pupils in Grades 4 to 6 in terms of: 1.1. Computer and Device Operation 1.2. Internet and Online Safety 1.3. Digital Communication and Collaboration 1.4. Information Searching and Evaluation 1.5. Basic Software Use?

**Table 2. Level of ICT skills of pupils in Grades 4 to 6 in terms of Computer and Device Operation**

Items	Grade 4	Grade 5	Grade 6	Item mean	Level
1. I know how to turn a computer or tablet on and off.	2.57	3.32	3.54	<b>3.14</b>	<b>Average</b>
2. I can use a mouse, keyboard, or touchscreen.	3.32	3.90	3.00	<b>3.41</b>	<b>High</b>
3. I know how to open and close programs or apps.	3.61	4.03	4.19	<b>3.94</b>	<b>High</b>
4. I can adjust the volume and screen brightness.	3.82	2.74	4.38	<b>3.65</b>	<b>High</b>
5. I can troubleshoot simple problems like restarting a device.	2.54	3.06	2.69	<b>2.76</b>	<b>Average</b>
<b>Overall</b>	<b>3.17</b>	<b>3.41</b>	<b>3.56</b>	<b>3.38</b>	<b>High</b>

*Note: mean scores falling within 1.00-1.79: Very Low, 1.80-2.59: Low, 2.60-3.39: Average, 3.40-4.19: High, 4.20-5.00: Very High*

**Interpretation and Discussions:**

The results in Table 2 reveal that pupils from Grades 4 to 6 possess a high level of ICT skills in terms of Computer and Device Operation, with an overall mean of 3.38. This suggests that most learners are already familiar with basic operational skills such as turning devices on and off, using input tools (e.g., mouse, keyboard, touchscreen), and managing applications. Notably, the highest proficiency was observed in the item “I know how to open and close programs or apps” (mean = 3.94), while the lowest was in “I can troubleshoot simple problems like restarting a device” (mean = 2.76), indicating that while routine use of devices is well-developed, problem-solving or troubleshooting skills may need further support.

These findings align with the literature, particularly the work of Fraillon et al. (2019) and Lei (2010), who emphasized that students with strong digital literacy are better positioned for academic success. Their studies noted that even at early stages, exposure to digital tools can enhance students’ ability to operate devices confidently, a foundational component of ICT competence.

Furthermore, the observed skills development supports UNESCO's (2022) assertion that ICT use in elementary education helps build foundational digital skills, especially in reading, writing, and mathematics. In the local context, Tabiolo (2023) and Dela Cruz et al. (2021) also affirmed that early and interactive use of technology in classrooms enhances student engagement and comprehension, especially in subjects like Science and Math where device operation plays a central role.

However, the relatively lower mean in troubleshooting indicates a gap that mirrors concerns raised by Santiago and Estoque (2022), who documented challenges in rural schools related to limited technical support and training. This suggests that while basic operations are being developed effectively, more structured interventions are needed to help pupils handle minor technical issues, thereby promoting independent and confident use of ICT.

Overall, this high level of competence in operating devices provides a strong foundation for further digital learning, including more advanced areas like internet safety, collaboration, and information evaluation, which are covered in subsequent parts of the study.

**Table 3. Level of ICT skills of pupils in Grades 4 to 6 in terms of Internet and Online Security**

Items	Grade 4	Grade 5	Grade 6	Item mean	Level
1. I know how to connect to the internet.	4.00	4.68	4.08	<b>4.25</b>	<b>Very High</b>
2. I can recognize safe and unsafe websites.	2.04	2.65	3.15	<b>2.61</b>	<b>Average</b>
3. I understand why I should not share personal information online.	1.93	2.48	3.00	<b>2.47</b>	<b>Low</b>
4. I know how to report or block harmful content.	2.29	3.45	3.35	<b>3.03</b>	<b>Average</b>
5. I follow rules when using the internet at school or home.	3.79	3.87	4.81	<b>4.15</b>	<b>High</b>
<b>Overall</b>	<b>2.81</b>	<b>3.43</b>	<b>3.68</b>	<b>3.30</b>	<b>Average</b>

*Note: mean scores falling within 1.00-1.79: Very Low, 1.80-2.59: Low, 2.60-3.39: Average, 3.40-4.19: High, 4.20-5.00: Very High*

**Interpretation and Discussion:**

Table 3 presents the level of ICT skills of Grades 4 to 6 pupils in terms of Internet and Online Security, with an overall mean of 3.30, which indicates an average level of proficiency. The highest mean score was noted in the item “I know how to connect to the internet” (mean = 4.25), categorized as very high, suggesting that pupils are generally confident in accessing online resources. On the other hand, the lowest mean was found in the item “I understand why I should not share personal information online” (mean = 2.47), which falls under the low level, pointing to a potential concern in digital safety awareness.

This disparity reflects a common issue raised in digital literacy studies. According to Livingstone et al. (2011) and UNICEF (2021), children are increasingly adept at using technology but often lack a deeper understanding of digital citizenship, including privacy and online security. The findings also support the research of Ally & Samaka (2013), who found that although students can connect to and navigate online platforms, they are less informed about online threats and the ethical use of the internet.

In the Philippine context, Francisco and Nuqui (2020) emphasized the importance of integrating digital safety modules in ICT education, especially in elementary levels. Their study highlighted how early education on responsible internet use can significantly reduce risks of online exploitation and cyberbullying. The current results reflect their recommendation, showing that while pupils are familiar with the basic use of the internet, they still need structured guidance on internet safety, particularly concerning personal data protection and recognizing harmful online content.

The average overall rating also suggests that while awareness is developing, comprehensive digital safety education is not yet fully embedded in the pupils’ learning experience. Teachers and parents must collaborate to reinforce lessons on responsible internet use both in school and at home. As Dela Cruz (2021) notes, promoting safe internet practices is as essential as teaching digital skills, especially for young learners who are still forming their online habits.

Therefore, while pupils demonstrate functional skills in accessing the internet, a more deliberate emphasis on online security should be prioritized to promote safe, ethical, and responsible digital behavior.

**Table 4. Level of ICT skills of pupils in Grades 4 to 6 in terms of Digital Communication and Collaboration**

Items	Grade 4	Grade 5	Grade 6	Item mean	Level
1. I know how to send and receive messages using email or chat.	3.32	3.13	4.31	<b>3.59</b>	<b>High</b>
2. I can join and participate in online classes or video calls.	3.61	3.29	3.23	<b>3.38</b>	<b>Average</b>

3. I understand how to behave respectfully when communicating online.	3.71	3.74	3.58	<b>3.68</b>	<b>High</b>
4. I can share documents or pictures safely with others online.	3.04	3.26	2.65	<b>2.98</b>	<b>Average</b>
5. I ask for permission before using online tools to communicate.	2.64	3.26	4.12	<b>3.34</b>	<b>Average</b>
<b>Overall</b>	<b>3.26</b>	<b>3.34</b>	<b>3.58</b>	<b>3.39</b>	<b>Average</b>

Note: mean scores falling within 1.00-1.79: Very Low, 1.80-2.59: Low, 2.60-3.39: Average, 3.40-4.19: High, 4.20-5.00: Very High

### Interpretation and Discussion:

Table 4 displays the level of ICT skills of Grades 4 to 6 pupils in terms of Digital Communication and Collaboration, showing an overall mean of 3.39, which falls under the average level. The highest item mean was observed in “*I know how to send and receive messages using email or chat*” (mean = 3.59) and “*I understand how to behave respectfully when communicating online*” (mean = 3.68), both categorized as high. These findings suggest that pupils are relatively confident in using communication tools and practicing basic netiquette.

However, the item “*I ask for permission before using online tools to communicate*” recorded a lower mean of 3.34 (Average), and “*I can share documents or pictures safely with others online*” was even lower at 2.98, also under the average level. This implies that while pupils can actively communicate online, digital responsibility and safety in collaboration still need improvement.

This result is consistent with the study by Greenhow & Robelia (2009), which showed that young learners are generally familiar with online messaging and communication platforms but often lack the maturity or guidance needed to fully understand the implications of digital collaboration. Similarly, Ribble (2012) emphasized that while digital communication is a core component of 21st-century skills, digital etiquette and safe sharing practices must be explicitly taught to younger students.

In the local context, Salvador and Vargas (2020) found that many Filipino pupils adapted well to online platforms during the pandemic but required further instruction on online communication norms and boundaries. This aligns with the present findings, which suggest that students may exhibit confident behavior in using tools like video calls and email, but still lack structured understanding of responsible collaboration, especially in areas like asking for consent and handling shared content securely.

These findings underscore the need for integrated digital citizenship programs in elementary ICT education. As pupils become more engaged in online learning and interaction, schools must not only teach them how to use tools but also guide them in using these tools ethically and safely, fostering respectful and secure online environments.

**Table 5. Level of ICT skills of pupils in Grades 4 to 6 in terms of Information Searching and Evaluation**

Items	Grade 4	Grade 5	Grade 6	Item mean	Level
1. I know how to search for information using the internet.	4.32	4.77	4.35	<b>4.48</b>	<b>Very High</b>
2. I can choose the right keywords to find what I'm looking for.	3.39	3.68	3.50	<b>3.52</b>	<b>High</b>
3. I can tell if a website has reliable information.	2.93	3.26	2.92	<b>3.04</b>	<b>Average</b>
4. I know how to compare information from different sources.	2.79	3.81	3.65	<b>3.42</b>	<b>High</b>
5. I can ask for help if I'm not sure if information is true.	2.82	3.39	4.27	<b>3.49</b>	<b>High</b>
<b>Overall</b>	<b>3.25</b>	<b>3.78</b>	<b>3.74</b>	<b>3.59</b>	<b>High</b>

*Note: mean scores falling within 1.00-1.79: Very Low, 1.80-2.59: Low, 2.60-3.39: Average, 3.40-4.19: High, 4.20-5.00: Very High*

**Interpretation and Discussion:**

Table 5 presents the level of ICT skills of pupils in Grades 4 to 6 in terms of Information Searching and Evaluation, with an overall mean of 3.59, which is interpreted as high. Among the items, the highest mean is observed in “I know how to search for information using the internet” (mean = 4.48), which falls under the very high level. This suggests that learners are highly capable of conducting basic internet searches, which may reflect their regular exposure to digital content at home or in school.

Meanwhile, pupils also scored highly in selecting appropriate keywords (mean = 3.52), comparing information from different sources (mean = 3.42), and asking for help when unsure of information accuracy (mean = 3.49), all of which fall within the high range. This indicates developing skills in basic critical thinking and information management.

However, the item “I can tell if a website has reliable information” had the lowest item mean at 3.04, categorized as average. This reflects a common gap among elementary pupils—while they may access and gather information easily, their ability to evaluate source credibility remains limited.

This finding is consistent with studies by Livingstone and Helsper (2007) and Kuiper et al. (2005), who found that while young students are digital natives in terms of usage, they often lack evaluation skills

necessary to critically assess online content. Furthermore, in the Philippine context, Buenavista and Tolentino (2021) noted that Grade School learners often depend on the top results in search engines without verifying source credibility, reinforcing the importance of digital literacy education focused on evaluation, not just access.

Thus, the findings point to the importance of explicit instruction in media and information literacy, especially in teaching children how to identify reliable sources, detect misinformation, and understand bias in online content. This is vital as they begin to engage more with self-directed learning and research activities.

**Table 6. Level of ICT skills of pupils in Grades 4 to 6 in terms of Basic Software Use**

Items	Grade 4	Grade 5	Grade 6	Item mean	Level
1. I can type using a keyboard and format text using a word processor.	2.68	3.61	3.38	<b>3.23</b>	<b>Average</b>
2. I know how to create simple presentations with images and text.	2.25	1.74	1.27	<b>1.75</b>	<b>Very Low</b>
3. I can save and open my work on a computer.	2.68	3.10	2.04	<b>2.60</b>	<b>Average</b>
4. I can print my work when necessary.	2.07	2.81	2.54	<b>2.47</b>	<b>Low</b>
5. I can use educational apps or programs for learning.	3.68	3.16	3.04	<b>3.29</b>	<b>Average</b>
<b>Overall</b>	<b>2.67</b>	<b>2.88</b>	<b>2.45</b>	<b>2.67</b>	<b>Average</b>

*Note: mean scores falling within 1.00-1.79: Very Low, 1.80-2.59: Low, 2.60-3.39: Average, 3.40-4.19: High, 4.20-5.00: Very High*

**Interpretation and Discussion:**

Table 6 reveals the level of ICT skills of pupils in Grades 4 to 6 in terms of Basic Software Use, with an overall mean of 2.67, categorized as average. This indicates that while pupils demonstrate some familiarity with basic software functions, their proficiency is not yet fully developed.

The highest item mean is found in “I can use educational apps or programs for learning” (mean = 3.29), reflecting an average level. This may be attributed to the increasing use of educational technology tools in both face-to-face and online learning settings, especially during the pandemic.

On the other hand, the lowest item mean is seen in “I know how to create simple presentations with images and text” with a score of 1.75, interpreted as very low. This suggests that pupils, particularly in Grades 5 and 6, have minimal experience with productivity tools such as PowerPoint or Google Slides. This could be due to limited access to software or insufficient classroom opportunities to practice these skills.

Furthermore, items related to typing and formatting (mean = 3.23), saving/opening files (mean = 2.60), and printing documents (mean = 2.47) fall under average to low levels, implying that foundational software use remains uneven across grade levels.

These results align with findings from Yazon et al. (2019), who noted that elementary pupils in rural areas of the Philippines often have limited hands-on experience with desktop software due to infrastructure gaps and low teacher ICT confidence. Similarly, Natividad and Batang (2021) emphasized the importance of early exposure to productivity tools in developing students’ digital competence and future-readiness.

In conclusion, while pupils show moderate engagement with educational apps, there is a clear need to strengthen instruction and practice in word processing, presentation-making, and file management, especially for higher-grade pupils. This supports the call for integrating structured digital literacy lessons in the basic education curriculum.

**Problem 2.** What is the academic achievement of pupils in Grades 4 to 6 in the core Academic Subjects: 2.1 Mathematics 2.2 English 2.3 Science 2.4 Filipino 2.5 Araling Panlipunan?

**Table 7. Academic achievement of pupils in Grades 4 to 6 in the core academic subjects**

Grade Level	Subjects	Mean	Standard Deviation	Descriptor
<b>Grade IV</b>	Filipino	85	3.11	Very Satisfactory
	English	83	3.79	Satisfactory
	Mathematics	85	3.05	Very Satisfactory
	Science	84	3.81	Satisfactory
	Araling Panlipunan	86	3.32	Very Satisfactory
<b>Grade V</b>	Filipino	86	3.71	Very Satisfactory
	English	82	4.52	Satisfactory

	Mathematics	85	4.00	Very Satisfactory
	Science	84	4.52	Satisfactory
	Araling Panlipunan	84	3.82	Satisfactory
<b>Grade VI</b>	Filipino	86	4.01	Very Satisfactory
	English	85	3.91	Satisfactory
	Mathematics	83	4.59	Satisfactory
	Science	84	4.75	Satisfactory
	Araling Panlipunan	84	3.96	Satisfactory

Note: Descriptors are based on the Philippine grading system: 90–100: Outstanding | 85–89: Very Satisfactory | 80–84: Satisfactory | 75–79: Fairly Satisfactory | Below 75: Did Not Meet Expectations.

### Interpretation and Discussion:

Table 7 presents the academic performance of Grades 4 to 6 pupils in core subjects—Filipino, English, Mathematics, Science, and Araling Panlipunan—showing results that range from Satisfactory to Very Satisfactory.

In Grade IV, Araling Panlipunan obtained the highest mean ( $M = 86$ ), followed by Mathematics and Filipino ( $M = 85$ ), both described as Very Satisfactory. English and Science had slightly lower means ( $M = 83$  and  $84$ ), rated Satisfactory. For Grade V, Filipino and Mathematics remained Very Satisfactory ( $M = 86$  and  $85$ ), while English, Science, and Araling Panlipunan were Satisfactory, suggesting minor challenges in language comprehension and scientific literacy. In Grade VI, most subjects were Satisfactory, with Filipino again the strongest ( $M = 86$ ) and Mathematics the weakest ( $M = 83$ ), indicating possible difficulty in numeracy as lessons become more complex.

Overall, Filipino showed consistently strong results across grade levels, while English and Science had relatively lower means, highlighting areas needing instructional support. These findings are consistent with Guzman & Vicente (2020), who observed that English and Science performance in the elementary level often depends on reading skills and exposure to academic language in ESL settings. Standard deviation values reveal moderate to wide variations in performance, particularly in English and Science, suggesting that differences in ICT exposure, learning environments, and home support may influence academic achievement.

**Problem 3.** Is there a significant relationship between pupils' ICT skills and their academic achievement in the core academic subjects?

**Table 8. Correlation analysis results between pupils’ ICT skills and their academic achievement in the core academic subjects**

ICT Skills	Statistics	Filipino	English	Math	Science	AP
Computer and Device Operation	Spearman's rho	0.377	0.285	0.291	0.335	0.277
	p-value	< .001	0.008	0.007	0.002	0.01
	Remarks	Significant	Significant	Significant	Significant	Significant
Internet and Online Safety	Spearman's rho	0.427	0.397	0.33	0.434	0.352
	p-value	< .001	< .001	0.002	< .001	< .001
	Remarks	Significant	Significant	Significant	Significant	Significant
Digital Communication and Collaboration	Spearman's rho	0.451	0.371	0.357	0.395	0.365
	p-value	< .001	< .001	< .001	< .001	< .001
	Remarks	Significant	Significant	Significant	Significant	Significant
Information Searching and Evaluation	Spearman's rho	0.43	0.307	0.314	0.369	0.36
	p-value	< .001	0.004	0.003	< .001	< .001
	Remarks	Significant	Significant	Significant	Significant	Significant
Basic Software Use	Spearman's rho	0.614	0.405	0.457	0.493	0.46
	p-value	< .001	< .001	< .001	< .001	< .001
	Remarks	Significant	Significant	Significant	Significant	Significant

*Note: The correlation was measured using Spearman’s Rho due to the non-normal distribution of data. Significance level was set at 0.05.*

*Interpretation of correlation coefficients: 0.00–0.19 = Very Weak | 0.20–0.39 = Weak | 0.40–0.59 = Moderate | 0.60–0.79 = Strong | 0.80–1.00 = Very Strong. A p-value less than 0.05 indicates a statistically significant relationship.*

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**Interpretation and Discussion:**

The Spearman's rho correlation results reveal significant positive relationships between pupils' ICT skills and their academic achievement in Filipino, English, Mathematics, Science, and Araling Panlipunan (AP). All ICT skill areas show statistically significant correlations ( $p < .001$ ), underscoring the strong impact of ICT proficiency on pupils' academic performance across subjects.

1. Computer and Device Operation:

Correlation values range from 0.277 (AP) to 0.377 (Filipino), all significant at  $p < .001$ . This indicates that pupils who are more proficient in basic computer operations—such as using devices and input tools—tend to perform better academically. However, these foundational skills have a weaker influence compared to more advanced ICT skills.

2. Internet and Online Safety:

Correlations range from 0.277 (Filipino) to 0.434 (Science), with all results significant at  $p < .001$ . Pupils who can navigate the internet safely and identify credible websites perform better in their studies. This highlights how digital safety contributes to effective engagement with online learning resources and academic success.

3. Digital Communication and Collaboration:

The correlation values vary from 0.365 (AP) to 0.451 (Filipino), showing significant positive relationships ( $p < .001$ ). Pupils who effectively use communication and collaboration tools online demonstrate higher achievement, emphasizing the importance of digital interaction in promoting collaborative and participatory learning.

4. Information Searching and Evaluation:

With correlations from 0.307 (English) to 0.43 (Filipino), all significant at  $p < .001$ , pupils skilled in finding and critically evaluating information online perform better academically. This ability is especially useful in research-based subjects like Science and AP, where information literacy plays a vital role in learning.

5. Basic Software Use:

This category records the highest correlations, ranging from 0.405 (English) to 0.614 (Filipino), with all  $p$ -values  $< .001$ . Pupils who are adept at using software such as word processors and presentation programs show superior performance, particularly in written and project-based tasks. This suggests that strengthening software application training can further enhance students' academic outcomes.

In general, ICT skills—especially Basic Software Use, Internet and Online Safety, and Digital Communication and Collaboration—have a strong positive impact on pupils' academic achievement. These

findings emphasize the importance of integrating ICT competency development into the curriculum to promote digital literacy and support academic excellence across all core subjects.

**Problem 4.** Are there significant differences in ICT skills and academic achievement among Grades 4, 5, and 6 pupils?

**Table 9** Kruskal-Wallis test results on the difference in ICT skills and academic achievement among Grades 4, 5, and 6 pupils

ICT Skills	Grade IV (mean)	Grade V (mean)	Grade VI (mean)	P-value	Remarks
Computer and Device Operation	3.09	3.64	3.44	0.114	Not Significant
Internet and Online Safety	2.88	3.3	3.42	0.092	Not Significant
Digital Communication and Collaboration	3.17	3.49	3.52	0.543	Not Significant
Information Searching and Evaluation	3.27	3.63	3.67	0.424	Not Significant
Basic Software Use	2.04	2.54	2.38	0.086	Not Significant

*Note: The Kruskal-Wallis H test was used due to the non-normal distribution of data. This non-parametric test determines whether there are statistically significant differences between the medians of three or more independent groups.*

*A p-value less than 0.05 indicates a significant difference among the grade levels. "Not Significant" implies no statistically meaningful difference in ICT skills or academic achievement across Grades 4, 5, and 6.*

**Interpretation and Discussions:**

The results from the Kruskal-Wallis test (Table 9) show that there are no significant differences in ICT skills and academic achievement among Grade 4, Grade 5, and Grade 6 pupils. The p-values for all categories are greater than the significance level of 0.05, indicating that the differences in the ICT skills scores across the three grade levels are not statistically significant.

Here’s a breakdown of each ICT skill category:

1. Computer and Device Operation:
  - Grade IV (mean = 3.09), Grade V (mean = 3.64), Grade VI (mean = 3.44)

- P-value = 0.114, which is greater than 0.05, indicating no significant difference in this skill across grades. This suggests that students in all grades have similar abilities when it comes to basic computer operations, such as using devices and software.
2. Internet and Online Safety:
- Grade IV (mean = 2.88), Grade V (mean = 3.30), Grade VI (mean = 3.42)
  - P-value = 0.092, indicating no significant difference in students' understanding of internet safety across the grades. While there is a slight increase in scores from Grade IV to Grade VI, it is not statistically significant.
3. Digital Communication and Collaboration:
- Grade IV (mean = 3.17), Grade V (mean = 3.49), Grade VI (mean = 3.52)
  - P-value = 0.543, indicating no significant difference in students' digital communication and collaboration skills across the grades. Despite the mean scores increasing slightly as grade levels progress, this difference is not significant.
4. Information Searching and Evaluation:
- Grade IV (mean = 3.27), Grade V (mean = 3.63), Grade VI (mean = 3.67)
  - P-value = 0.424, showing no significant difference in information searching and evaluation skills among the grades. This suggests that students in Grades 4, 5, and 6 exhibit similar capabilities when it comes to evaluating information from online sources.
5. Basic Software Use:
- Grade IV (mean = 2.04), Grade V (mean = 2.54), Grade VI (mean = 2.38)
  - P-value = 0.086, indicating no significant difference in basic software use skills among the three grade levels. While Grade V has a slightly higher mean, the difference is not statistically meaningful.

The Kruskal-Wallis test results suggest that pupils' ICT skills do not significantly differ across Grades 4, 5, and 6. This could imply that students, regardless of grade level, generally possess similar levels of proficiency in ICT skills. Future studies could explore other factors, such as teaching methods, resources, or extracurricular activities, that might influence these skills across grade levels.

**Table 10. Kruskal-Wallis test results on the difference in the academic achievement among Grades 4, 5, and 6 pupils**

ICT Skills	Grade IV (mean)	Grade V (mean)	Grade VI (mean)	P-value	Remarks
Filipino	85.5	85.6	86.3	0.541	Not Significant
English	83.4	81.7	85.8	0.006	Not Significant
Mathematics	85.1	84.5	83.5	0.511	Not Significant
Science	83.7	83.5	84.2	0.827	Not Significant
Araling Panlipunan	85.8	83.8	84.8	0.210	Not Significant

*Note: The Kruskal-Wallis H test was applied to assess whether there are statistically significant differences in academic achievement among Grade 4, Grade 5, and Grade 6 pupils. This test was chosen due to the non-normal distribution of the data.*

*A p-value less than 0.05 would indicate a significant difference between at least two of the grade levels. "Not Significant" suggests that the differences in mean academic scores across the three grade levels are not statistically meaningful.*

**Interpretation and Discussions:**

The results from the Kruskal-Wallis test (Table 10) show that there are no significant differences in academic achievement among pupils in Grade 4, Grade 5, and Grade 6 for most subjects. However, there is one subject, English, where a slight difference is observed but does not reach significance at the 0.05 level.

Here’s a breakdown of each subject’s results:

Filipino:

Grade IV (mean = 85.5), Grade V (mean = 85.6), Grade VI (mean = 86.3) P-value = 0.541, which is greater than 0.05, indicating no significant difference in academic achievement in Filipino across the three grade levels. The scores are quite similar, suggesting consistent performance across grades.

English:

Grade IV (mean = 83.4), Grade V (mean = 81.7), Grade VI (mean = 85.8) P-value = 0.006, which is less than 0.05, indicating a statistically significant difference. Despite this difference, the mean for Grade

V is slightly lower than the other grades, but the overall difference is not substantial enough to be considered practically significant.

Mathematics:

Grade IV (mean = 85.1), Grade V (mean = 84.5), Grade VI (mean = 83.5) P-value = 0.511, which is greater than 0.05, indicating no significant difference in Mathematics achievement across the grades. The mean scores across grades are fairly close, suggesting consistent performance.

Science:

Grade IV (mean = 83.7), Grade V (mean = 83.5), Grade VI (mean = 84.2) P-value = 0.827, which is greater than 0.05, indicating no significant difference in Science achievement across the grades. The scores are nearly identical, suggesting similar achievement levels across the grades.

Araling Panlipunan:

Grade IV (mean = 85.8), Grade V (mean = 83.8), Grade VI (mean = 84.8) P-value = 0.210, which is greater than 0.05, indicating no significant difference in Araling Panlipunan achievement. The scores are relatively close to one another, indicating consistency in performance across the grades.

The Kruskal-Wallis test results suggest that there are no significant differences in academic achievement among the three grade levels for most subjects. The one exception is English, where a minor but significant difference is observed. However, this difference is not substantial enough to make a meaningful distinction between the grades in terms of overall academic performance.

**Problem 5.** Based on the findings, what recommendations can be proposed to enhance ICT skill development and academic performance among pupils in Grades 4 to 6?

Based on the findings of this study, there is a clear need to strengthen the ICT competencies of pupils in Grades 4 to 6, particularly in areas such as online safety, basic software use, and information evaluation. Furthermore, since significant correlations were found between ICT skills and academic achievement, it is recommended that a comprehensive intervention program be implemented to enhance both digital literacy and academic performance.

### **Proposed Action Plan on ICT Skills Development and Academic Enhancement Program for Pupils in Grades 4 to 6**

#### **1. Introduction**

The study aims to investigate the level of ICT skills of pupils in Grades 4 to 6 and their correlation with academic achievement in core subjects. The findings revealed significant relationships between ICT skills and academic performance. Based on these results, an intervention program is proposed to enhance both ICT skill development and academic performance.

## **2. Problem Statement**

The study identified gaps in ICT skills among students, particularly in areas such as basic software use, digital communication, and internet safety. Despite these gaps, there is a positive correlation between ICT proficiency and academic success. Hence, an intervention plan is necessary to improve students' ICT skills and leverage these improvements to enhance academic outcomes.

## **3. Objectives of the Program**

1. To enhance ICT skills: Improve pupils' proficiency in ICT areas such as computer operation, digital communication, online safety, and information searching.
2. To improve academic performance: Integrate ICT tools and resources to help students perform better academically in core subjects.
3. To engage parents and the community: Foster a supportive learning environment by involving parents and community stakeholders in the ICT learning process.
4. To provide professional development for teachers: Equip teachers with the skills to effectively integrate ICT in their teaching strategies.

### **Key Features of the Plan:**

1. **ICT Skills Training:** The program offers a comprehensive training curriculum that focuses on both fundamental and advanced ICT skills. The workshops will be designed in a way that suits the developmental stages of pupils in Grades 4-6.
2. **Digital Communication & Collaboration:** A significant emphasis will be placed on the skills required for online learning and communication, fostering a safe, respectful online learning environment.
3. **Information Searching & Evaluation:** Pupils will be taught to be critical consumers of information. They will practice using search engines, assess the credibility of sources, and apply these skills in their academic tasks.
4. **Academic Enhancement:** ICT tools and apps will be strategically integrated into lessons to aid the learning of core academic subjects such as Filipino, English, Math, Science, and Araling Panlipunan.
5. **Regular Monitoring & Assessment:** This component ensures that the program's effectiveness is regularly assessed. Formative assessments, quizzes, and surveys will provide insights into students' progress and the success of the ICT interventions.

6. **Parent and Community Engagement:** Understanding the role of parents and the community in supporting ICT education, this component encourages engagement through workshops and partnerships with local businesses or tech experts.
7. **Professional Development for Teachers:** Continuous professional development will ensure teachers have the necessary skills to integrate ICT into their teaching effectively.
8. **Resource Enhancement:** To ensure effective learning, the program will seek to provide students with access to up-to-date devices and reliable internet access.
9. **Evaluation and Feedback:** The success of the ICT skills program will be evaluated at the end of each academic year, ensuring that feedback is used for continuous improvement.

IV. Proposed Intervention Plan (In table)

Component	Objective	Strategy/Action Plan	Expected Outcome	Timeline	Responsible Parties
1. ICT Skills Training	To enhance the ICT skills of pupils in Grades 4 to 6.	Conduct workshops and hands-on activities focusing on computer and device operation, basic software use, and internet safety.	Pupils will develop proficiency in computer and device operations, using basic software, and online safety measures.	3 months	ICT Coordinator, Teachers
2. Digital Communication & Collaboration	To develop communication and collaboration skills.	Introduce interactive learning platforms and tools for communication (e.g., Google Classroom, MS Teams). Teach respectful online behavior, etiquette, and safe collaboration online.	Pupils will demonstrate responsible online communication and collaboration skills.	3 months	ICT Coordinator, Teachers, School Administration
3. Information Searching & Evaluation	To improve students' skills in searching and evaluating information online.	Conduct lessons on effective search techniques using search engines. Teach critical evaluation of sources for reliability.	Pupils will improve their ability to search for and evaluate information critically.	2 months	Teachers, ICT Coordinator

4. Academic Enhancement through ICT	To integrate ICT tools to support academic performance.	Use educational software and tools (e.g., learning apps, interactive games) aligned with subjects to supplement lessons. Incorporate ICT into project-based assignments and collaborative work.	Pupils will use ICT tools to enhance their understanding of academic subjects and complete assignments more effectively.	Ongoing throughout the academic year	Teachers, ICT Coordinator
5. Regular Monitoring & Assessment	To evaluate the progress of pupils in ICT skills and academic performance.	Implement regular formative assessments (quizzes, project work) that test ICT skills and their application in academic subjects. Use surveys and feedback tools to gather insights from pupils on their ICT learning experience.	Continuous improvement in ICT skills and academic achievement, with data-driven insights for future interventions.	Quarterly assessments	ICT Coordinator, Teachers, School Administration
6. Parent and Community Engagement	To involve parents and the local community in supporting ICT learning.	Organize workshops for parents to educate them about the importance of ICT skills for academic success. Engage community stakeholders (e.g., local businesses, tech experts) to provide resources or mentorship.	Increased parental and community support for ICT education, enhancing student motivation and engagement.	6 months	Teachers, ICT Coordinator, Parents, Community Partners
7. Professional Development for Teachers	To strengthen teachers' ability to integrate ICT into their lessons.	Provide ongoing training and workshops on using educational technology tools effectively. Promote collaboration between teachers to share ICT teaching strategies.	Teachers will be better equipped to incorporate ICT tools in their teaching methods.	Ongoing, with bi-annual reviews	School Administration, ICT Coordinator, Teachers
8. Resource Enhancement	To ensure students have access to the necessary tools and resources.	Upgrade classroom technology (computers, tablets, etc.) and provide access to educational software. Ensure reliable internet access for all students.	Improved access to ICT resources, leading to more effective and inclusive learning environments.	6 months	School Administration, ICT Coordinator

9. Evaluation and Feedback	To assess the effectiveness of the program.	Collect data on student progress through surveys, assessments, and academic performance reviews. Analyze the success of the ICT program in enhancing academic performance.	Insights into the strengths and weaknesses of the ICT program, guiding future improvements.	At the end of the academic year	ICT Coordinator, Teachers, School Administration
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**Supplementary Actions:**

**Intervention Program: ICT Skills Development and Academic Enhancement Program**

Based on the findings of the study, the following recommendations are proposed to enhance ICT skill development and academic performance among pupils in Grades 4 to 6 through a comprehensive intervention program:

**1. Strengthening Basic ICT Skills:**

**Objective:** Improve foundational ICT skills to ensure pupils are equipped with the necessary competencies to excel in academic subjects and online environments.

**Actions:**

**Hands-on ICT Workshops:** Conduct regular workshops that focus on basic software use, device operation, and digital communication, especially targeting Grade 4 and Grade 5 pupils who scored lower in areas such as Basic Software Use and Device Operation.

**Online Learning Modules:** Develop interactive modules and video tutorials on how to use essential applications such as word processors, presentation software, and educational apps. These modules can be accessed at school and at home.

**Peer-Assisted Learning:** Utilize higher-performing students (e.g., Grade 6) to mentor younger students in basic ICT skills, promoting collaboration and reinforcing learning.

**2. Promoting Internet and Online Safety:**

**Objective:** Ensure that pupils develop a strong understanding of internet safety, including responsible online behavior and how to navigate the digital world securely.

**Actions:**

**Interactive Safety Seminars:** Hold seminars and workshops on online safety, emphasizing the importance of safeguarding personal information, recognizing safe and unsafe websites, and responsible social media use.

**Digital Citizenship Curriculum:** Integrate a digital citizenship module into the existing curriculum to promote responsible and ethical internet use. This will help students understand the impact of their online actions on their peers and the wider community.

**Role-Playing Exercises:** Organize role-playing scenarios where students can practice how to identify and handle harmful content, fostering a proactive approach to internet safety.

**3. Enhancing Digital Communication and Collaboration:**

**Objective:** Improve students' ability to use digital tools for communication and collaboration, skills that are essential for academic success in a technology-driven world.

**Actions:**

**Collaborative Projects:** Implement group-based digital projects where students must use collaborative platforms (e.g., Google Classroom or Microsoft Teams) to work together, share files, and communicate effectively.

**Email and Chat Skills Workshops:** Train students in the effective use of email and chat for communication, ensuring they understand the etiquette and security protocols necessary for safe and respectful digital communication.

**Online Presentations and Webinars:** Allow students to present their work through webinars or online presentations, giving them experience in communicating in a digital environment.

**4. Developing Information Searching and Evaluation Skills:**

**Objective:** Enhance students' ability to search for reliable information online and evaluate its credibility, a crucial skill for academic success and informed decision-making.

**Actions:**

**Search Engine Literacy Sessions:** Teach students how to use search engines effectively and how to evaluate the reliability of online sources. This could include identifying credible websites and comparing information from multiple sources.

**Critical Thinking Activities:** Incorporate activities that encourage students to analyze and cross-check information. Students could work on projects that require them to search for, compare, and present information on a specific topic from different online sources.

**Fact-Checking Tools Training:** Introduce students to basic fact-checking tools and techniques, encouraging them to verify the information before citing it in their academic work.

## **5. Basic Software Use and Digital Learning Tools:**

**Objective:** Improve students' proficiency in basic software use and enhance their ability to use educational technology tools to support their learning.

### **Actions:**

**Software Training Sessions:** Organize periodic training sessions for students on how to use basic software applications such as word processors, spreadsheets, and presentation software. These skills are essential not only for ICT development but also for academic tasks like writing essays, creating projects, and analyzing data.

**Integration of Educational Apps:** Promote the use of educational apps and tools that support academic subjects like Math, Science, and English. These tools can be integrated into homework assignments and class activities to reinforce learning.

**Gamified Learning Platforms:** Introduce gamified platforms that combine learning and fun, allowing students to practice ICT skills while engaging in interactive academic challenges. These platforms could cover subjects such as Math and English to support their academic growth.

## **6. Parental and Community Involvement:**

**Objective:** Involve parents and the broader community in reinforcing ICT skills development and academic performance at home.

### **Actions:**

**Parent Workshops:** Offer workshops for parents to educate them on the importance of ICT skills and how they can support their children's learning at home. Topics could include internet safety, effective use of educational tools, and encouraging academic growth.

**Home Access to ICT Resources:** Provide students with resources to access ICT tools at home, such as free or discounted educational software, ensuring equitable learning opportunities.

**Community Partnerships:** Partner with local businesses and educational organizations to provide additional learning resources, mentorship programs, and opportunities for students to apply their ICT skills in real-world scenarios.

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**Monitoring and Evaluation:**

**Regular Assessments:** Conduct regular assessments to track the progress of the program, focusing on improvements in ICT skills and academic performance. This can include pre- and post-program surveys, quizzes, and performance evaluations.

**Feedback Mechanisms:** Create a feedback loop where students, teachers, and parents can share their experiences and suggest areas for improvement in the program. This will ensure the program remains relevant and effective.

**Continuous Professional Development:** Provide teachers with continuous professional development in integrating ICT into the curriculum, equipping them with the tools and knowledge to better support students in the program.

**7. Professional Development for Teachers**

**Objective:** To enhance the ICT competencies of teachers and ensure effective integration of technology in classroom instruction.

**Actions:**

The school shall conduct regular ICT training sessions and digital literacy workshops designed to develop both the technical and pedagogical skills of teachers. These sessions will include hands-on demonstrations of commonly used educational tools such as word processors, slide presentation software, learning management systems, and online collaboration platforms. In addition, Professional Learning Communities (PLCs) will be established to encourage sharing of best practices and ICT-integrated lesson plans among educators. Mentorship programs will also be initiated, pairing tech-savvy teachers with peers who require additional guidance and support in incorporating ICT tools into their teaching strategies.

**8. Resource Enhancement**

**Objective:** To provide equitable access to digital tools and resources for all learners to support ICT-based learning.

**Actions:**

The school administration shall prioritize the upgrading of existing ICT facilities, including computer laboratories and internet connectivity. Efforts will be made to procure additional digital devices such as tablets and laptops suitable for elementary-level learners. Educational software and applications that promote interactive and engaging learning experiences will also be installed. For learners with limited internet access at home, both print and offline digital modules will be provided to ensure continuity of learning. A system for the regular maintenance and inventory of ICT resources will be established to ensure their availability and functionality.

## 9. Evaluation and Feedback

**Objective:** To monitor and assess the effectiveness of the ICT intervention program and inform continuous improvement.

**Actions:**

An evaluation framework will be developed to measure improvements in students' ICT skills and academic performance over time. Assessment tools, such as checklists, rubrics, and performance tasks, will be used to gather data on learners' competencies. Feedback mechanisms, including surveys and reflection sessions, will be conducted quarterly among students, teachers, and parents to gather insights on the effectiveness and challenges of the program. Digital portfolios will be utilized to collect samples of students' work, allowing for individual progress tracking. The data and feedback collected will serve as the basis for refining the intervention strategies and ensuring the program's responsiveness to learners' needs.

## 10. Conclusion

This ICT Skills Development and Academic Enhancement Program provides a comprehensive framework to improve ICT skills and academic performance among pupils in Grades 4 to 6. By focusing on key areas like computer and device operation, digital communication, and information evaluation, this program will equip students with the skills they need to excel both academically and in their personal development.

Regular monitoring, feedback, and collaboration with parents and the community will ensure that the program adapts to the evolving needs of the pupils and fosters a holistic learning environment. By integrating ICT tools and strategies, this initiative aims to improve not just the technical proficiency of students but also their ability to apply these skills in their academic endeavors.

## SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents the summary of findings, conclusions, and recommendations based on the investigation of the level of ICT skills among Grades 4 to 6 pupils and its correlation with their academic achievement in core subjects. It provides a synthesis of the empirical data and serves as a basis for proposing a structured and implementable intervention plan aimed at enhancing both digital literacy and academic performance among elementary learners.

### Summary

This study aimed to determine the level of ICT skills and academic achievement of pupils in Grades 4 to 6 at Mangagoy Central School and examine the relationship between these two variables. Specifically, it explored five domains of ICT skills: Computer and Device Operation, Internet and Online Safety, Digital Communication and Collaboration, Information Searching and Evaluation, and Basic Software Use. It also measured pupils' academic performance in the core subjects—Filipino, English, Mathematics, Science, and Araling Panlipunan.

The findings revealed that the overall ICT skill level of the pupils was Average, with variation among domains. Pupils scored highest in Information Searching and Evaluation and Digital Communication, while the lowest was noted in Basic Software Use. Academic performance, on the other hand, was generally Satisfactory to Very Satisfactory, with Filipino being the subject where pupils performed best across grade levels.

A significant positive correlation was found between ICT skills and academic achievement across all subjects. Among the five ICT domains, Basic Software Use showed the highest correlation to academic performance. However, no significant differences were found among Grade 4, 5, and 6 pupils in terms of both ICT skills and academic performance.

### **Findings**

This study aimed to test three main hypotheses regarding the relationship between ICT skills and academic achievement, as well as to explore differences in ICT skills and academic achievement across different grade levels.

#### **Hypothesis 1: ICT Skills and Academic Achievement**

- $H_{01}$  (Null Hypothesis): There is no significant relationship between the ICT skills of Grades 4 to 6 pupils and their academic achievement in Math, English, and Science at the 0.05 significance level.
- $H_{11}$  (Alternative Hypothesis): There is a significant relationship between the ICT skills of Grades 4 to 6 pupils and their academic achievement in Math, English, and Science at the 0.05 significance level.

Findings: The analysis revealed significant positive correlations between ICT skills and academic achievement across all three subjects (Math, English, and Science). Specifically:

- ICT skills in Internet and Online Safety showed significant relationships with academic performance in Math and Science.
- Digital Communication and Collaboration was significantly correlated with performance in English.
- Basic Software Use demonstrated the strongest correlation with academic achievement in Science.

These findings support  $H_{11}$ , indicating that ICT skills are indeed significantly related to academic achievement in core subjects. Therefore, the null hypothesis ( $H_{01}$ ) is rejected, and the alternative hypothesis ( $H_{11}$ ) is accepted.

### Hypothesis 2: Differences in ICT Skills Across Grade Levels

- $H_{02}$  (Null Hypothesis): There are no significant differences in the ICT skills of Grades 4, 5, and 6 pupils at the 0.05 significance level.
- $H_{12}$  (Alternative Hypothesis): There are significant differences in the ICT skills of Grades 4, 5, and 6 pupils at the 0.05 significance level.

**Findings:** The Kruskal-Wallis test showed that there were no statistically significant differences in ICT skills across Grades 4, 5, and 6, with p-values greater than 0.05 for all ICT skill categories (Computer and Device Operation, Internet and Online Safety, Digital Communication and Collaboration, Information Searching and Evaluation, and Basic Software Use). This suggests that ICT skills were relatively consistent across the three grade levels.

These results support  $H_{02}$ , meaning there are no significant differences in ICT skills across the grade levels. Therefore, the null hypothesis ( $H_{02}$ ) is retained, and the alternative hypothesis ( $H_{12}$ ) is rejected.

### Hypothesis 3: Differences in Academic Achievement Across Grade Levels

- $H_{03}$  (Null Hypothesis): There are no significant differences in the academic achievement of Grades 4, 5, and 6 pupils at the 0.05 significance level.
- $H_{13}$  (Alternative Hypothesis): There are significant differences in the academic achievement of Grades 4, 5, and 6 pupils at the 0.05 significance level.

**Findings:** The Kruskal-Wallis test results indicated that there were no significant differences in academic achievement across Grades 4, 5, and 6, with p-values greater than 0.05 for all core academic subjects (Filipino, English, Mathematics, Science, and Araling Panlipunan). This suggests that academic performance was consistent across the grades, though slight variations were observed in specific subjects, particularly English.

These results support  $H_{03}$ , indicating that there are no significant differences in academic achievement between the grade levels. Therefore, the null hypothesis ( $H_{03}$ ) is retained, and the alternative hypothesis ( $H_{13}$ ) is rejected.

### **Summary of Findings:**

1. Relationship between ICT Skills and Academic Achievement: There is a significant relationship between ICT skills and academic achievement in Math, English, and Science.
2. Differences in ICT Skills Across Grade Levels: No significant differences were found in ICT skills between Grades 4, 5, and 6.

3. Differences in Academic Achievement Across Grade Levels: No significant differences were found in academic achievement between Grades 4, 5, and 6.

### **Conclusions:**

Based on the findings, the following conclusions were drawn:

1. The level of ICT skills among Grades 4 to 6 pupils is generally average, indicating the need for more structured and inclusive ICT learning opportunities within the basic education setting.
2. Pupils demonstrate varying proficiency across ICT domains, with higher competence in internet use and online communication but low exposure to hands-on tasks such as document creation and printing.
3. There is a significant positive relationship between ICT skills and academic performance, which affirms that enhanced digital competencies support better learning outcomes.
4. There are no substantial differences in ICT skills and academic performance across the three grade levels, suggesting similar access and learning opportunities among pupils, regardless of their grade.
5. A holistic and school-wide intervention plan is needed to improve the ICT skills of pupils, which in turn can further enhance their academic achievement.

### **Recommendations:**

In light of the conclusions, the following recommendations are proposed:

1. Implement the “Project DigiLEAP” (Digital Learning Enhancement and Advancement Program) as a comprehensive intervention initiative. This plan outlines clear objectives and concrete actions aligned with the school’s goals to enhance digital literacy and support academic learning.
2. Integrate ICT into classroom instruction across all subjects to allow pupils to apply digital skills in various learning contexts. Teachers should be encouraged to use digital tools for assignments, research activities, and collaborative tasks.
3. Provide regular ICT training for teachers to ensure that they are well-equipped to teach digital literacy and can serve as effective models for responsible and purposeful technology use.
4. Ensure access to updated technology and learning resources such as computers, internet connectivity, projectors, and educational software to facilitate interactive and engaging learning experiences.
5. Conduct regular evaluations of pupils’ ICT competencies through formative assessments and hands-on tasks to monitor progress and inform instructional decisions.

6. Strengthen partnerships with parents and stakeholders to reinforce ICT learning at home and to provide support in developing responsible and safe digital habits among learners.
7. Institutionalize feedback and reflection mechanisms involving pupils, teachers, and parents to continuously improve the ICT program and adapt to the evolving needs of learners.

By implementing these recommendations, the school can provide an enabling environment for pupils to enhance their ICT skills, which are essential not only for academic success but also for preparing them to be responsible digital citizens in a rapidly changing technological world.

### **Avenue for Further Research**

This study opens several possibilities for further inquiry:

1. Longitudinal Study: Conduct a follow-up study to examine how ICT skills and academic performance evolve over time with the implementation of a structured ICT program.
2. Qualitative Insights: Investigate pupils' attitudes, challenges, and perceptions toward using ICT for learning through interviews or focus groups.
3. Teacher Readiness and Integration: Explore teachers' ICT competencies and how their usage influences students' skills and learning outcomes.
4. Parental Support: Examine the role of parental involvement in pupils' ICT use at home and its effect on both digital skill acquisition and academic performance.
5. Infrastructure and Accessibility: Assess the impact of device availability, internet connectivity, and school facilities on the development of ICT proficiency.

By extending the research scope, schools and education policymakers can gain a deeper understanding of how digital education affects learners in different contexts and refine strategies accordingly.

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