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Theory-Skill Alignment in Information and Communication Technology

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Abstract - *This study examined the alignment between theoretical knowledge and practical skills in Information and Communication Technology (ICT) among Grade 11 students of PHINMA Araullo University for the academic year 2024–2025. Using a descriptive-correlational design and total enumeration sampling, data were collected from 500 students through a validated questionnaire assessing competencies in information literacy and technical ICT skills across domains such as information access, software use, cybersecurity, communication, multimedia creation, and hardware integration. The findings showed students were "Literate" in information literacy and "Proficient" in technical skills, with strengths in accessing academic resources and multimedia creation, but with gaps in cybersecurity, advanced software use, and hardware troubleshooting. Significant correlations were found between ICT competencies and demographic factors like age, sex, academic strand, socioeconomic status, and previous school type. A strong relationship between information literacy and technical ICT skills was also identified. The study concluded that targeted interventions and curriculum improvements are essential to bridge the theory-practice gap and enhance students' digital readiness for academic and professional success.*

Key Words: **theory-skill alignment, ICT competencies, information literacy, technical skills, cybersecurity, curriculum development**

1.INTRODUCTION

The capacity to adapt and use knowledge effectively is essential for success in any area, but it's especially important in information and communication technology (ICT) given how quickly technology is changing nowadays. As the ICT industry's needs continue to expand, so does the requirement for people who can not only comprehend theoretical ideas but also turn them into workable solutions. To succeed in their future employment, students pursuing IT degrees, like aspiring architects, need to establish a strong theoretical and technical basis.

However, many students find it difficult to make the shift from theory to skill, especially in their early academic years. Even if they have a solid theoretical foundation, students usually struggle to apply what they have learned in technical situation. While some students have excellent technical skills but a shallow comprehension of the fundamentals, others perform well academically but struggle with technical projects.

According to Greenway (2018), the term 'theory–skill gap' is commonly used in the nursing field, though it is often imprecisely defined and interpreted differently by individuals.

The concept of a theory–skill gap, frequently referenced in nursing literature, is often discussed in terms such as 'bridged,' 'breached,' or 'negotiated,' yet rarely with a consistent definition (Greenway, 2018). The complex nature of the theory–skill gap is not fully understood. However, there is widespread agreement within classical and current literature, that it relates to the distancing of theoretical knowledge from the actual doing of skill.

The study looked at both the theory and technical skills of Grade 11 students in ICT. It concentrated on their proficiency with hardware, software, and the internet in addition to their capacity to get, assess, and apply knowledge efficiently. The study also assessed students' proficiency in different ICT domains in order to determine how prepared they were for upcoming academic obstacles and career prospects. Through examining these competencies, the research sought to provide a thorough understanding of students' preparedness for the demands of their future studies and careers in the ICT industry. It also assessed how well students could find, understand, and use information.

By focusing on the balance between these two critical skill sets, the research aimed to provide insights that would inform curriculum design and teaching skills. The findings contributed to the development of a more holistic IT education, enabling students to thrive both academically and professionally and ensuring that they were equipped to meet the evolving demands of the ICT field. The research assisted instructors in implementing focused interventions and enhancing educational outcomes by recognizing students' strengths and limitations.

With over six years of experience in ICT education, the researcher has developed a deep understanding of the challenges students face in bridging theoretical knowledge with practical application. Currently serving as an ICT instructor at PHINMA Araullo University, the researcher has consistently observed a recurring struggle among senior high school students particularly those in Grade 11 to transfer what they learn in the classroom into real-world ICT tasks. This concern prompted the need to conduct a focused study on the alignment between theory and skills in the ICT strand. The research was driven by a commitment to improving student outcomes by identifying specific areas of weakness and designing instructional strategies that support both academic learning and technical proficiency. Through this study, the researcher aimed to contribute valuable insights that could enhance teaching methods, close the theory-skill gap,

and better prepare students for the rapidly evolving demands of the ICT industry.

2. Review of Related Literature and Studies

Information and Communication Technology (ICT) skills have become essential in the digital age, particularly in education. Several factors such as age, academic strand, socioeconomic status (SES), and the type of school graduated from influence the development and proficiency of students' ICT skills in the Philippines.

Age

Age plays a role in ICT proficiency, as younger students often digital natives tend to be more exposed to technology and adapt more quickly to digital tools (Ariola & Cabansag, 2020). However, older students may demonstrate stronger critical thinking and responsible use of ICT due to greater maturity and learning experience. According to Eurostat (2024), digital skills tend to decline with age in the EU. While a majority (about 55%) of individuals aged 16–74 had basic digital skills, only a fraction of older adults—around one-third of men and one-quarter of women aged 65–74—demonstrated the same level of competency, highlighting a generational digital gap.

Academic strand

Academic strand is another significant factor. Students in the STEM and ICT-related strands usually have more direct exposure to digital technologies through specialized subjects and computer-based activities, giving them a technical advantage compared to students from HUMSS or TVL strands (Gonzales, 2019). The curriculum design in these strands fosters higher ICT engagement, which builds stronger digital competence. Thongsri, Shen, and Bao (2019) found that STEM students demonstrated significantly higher computer self-efficacy and stronger intentions to adopt e-learning technologies compared to their non-STEM peers. Their study highlights how curriculum design and academic focus influence digital preparedness, suggesting that strand-based differences should be considered in planning ICT interventions and educational reforms.

Socioenomic Status

In the Philippines, socioeconomic status is commonly assessed through monthly household income, which serves as the basis for determining poverty thresholds. In the Philippines, socioeconomic status is commonly assessed through monthly household income, which serves as the basis for determining poverty thresholds. According to the Philippine Statistics Authority (PSA, 2023), a family of five needed to earn at least ₱13,873 per month in 2023 to be considered above the poverty line. This amount, known as the poverty threshold, covers both food and essential non-food needs. Families earning less than this are classified as poor. The food threshold alone the minimum amount required to meet basic nutritional needs—was ₱9,550 per month during the same period. This figure, known as the poverty threshold, covers the cost of both food and basic non-food needs. Families earning below this amount are classified as poor (Philippine Statistics Authority [PSA], 2023). The food threshold alone representing the minimum amount required for sustenance—was ₱9,550 per month during the same period. Socioeconomic status (SES) has long been recognized as a key factor influencing students' educational outcomes, including their digital competence. Although the effect was modest compared to other academic subjects like reading and math, the trend highlighted the persistent influence of economic factors on digital proficiency. Although the SES-digital literacy relationship was weaker than that observed for reading or math, it still points to a persistent digital divide. The researchers emphasized that this relationship is influenced by how SES and ICT skills are measured, but the overall trend consistently supports the idea that students with greater access to resources tend to develop stronger ICT competencies.

Type of School graduated from

The type of school attended private or public—also impacts ICT skill acquisition. Private schools often have better ICT infrastructure, such as up-to-date computer labs, faster internet, and smaller class sizes that allow more individualized instruction. These gaps can lead to significant differences in students' confidence and competence in using ICT tools, especially for academic and professional purposes.

A growing body of evidence shows that students from private schools tend to develop stronger ICT proficiency compared to those from public schools, largely due to superior infrastructure, smaller class sizes, and more frequent technology integration in instruction. Internationally, a Chilean study by González Pizarro et al. (2024) found that incoming STEM university students from private schools demonstrated higher levels of computational thinking than their public school peers, reflecting systemic differences in access and prior exposure.

Navarro (2024) reported that a considerable number of public schools in the Philippines have not met national ICT infrastructure standards. Specifically, only 78% of primary and 80% of junior high schools meet the minimum requirements for internet and computer access, contributing to inequities between public and private institutions. Navarro noted that these infrastructure gaps in Philippine public schools hinder the integration of ICT into the curriculum and limit students' ability to develop essential digital skills. In comparison, private schools are generally better equipped, offering students more opportunities to engage with technology and build confidence in using digital tools for academic and professional tasks. This disparity underscores the need for more equitable investments in ICT infrastructure to close the digital divide between public and private education sectors.

Information literacy

Information literacy refers to the skill of effectively utilizing available information to achieve a specific goal (Lokse et al., 2017). Many of its key skills, e.g., assessing and processing information and solving problems, are key components of 21st-century skills, i.e., abilities essential for entering and being successful in the rapidly changing job market and working life. IT has been changing or influencing the behavior or working scenario of individuals, groups and society. IT enables a person to deal with electronic gadgets and exploit them. Raja and Nagasubramani (2018) emphasized that "information literacy is related to information technology skills, but has broader implications for the individual, the educational system, and for society"Information technology skills enable an individual to use computers, software applications, databases, and other technologies to achieve a wide variety of academic, work-related, and personal goals. Information literate individuals necessarily develop some technology skills." With the advent and diffusion of the ICT, it has become a reality that people can access information.

Manitoba Education and Training (2015) defines Literacy with ICT (LwICT) as the capacity to engage with digital tools thoughtfully and ethically, fostering both critical thinking and creativity while navigating digital spaces responsibly as informed global citizens. Literacy with Information and Communication Technology (LwICT) not only focuses on technical skills but also encourages individuals to navigate the digital world with awareness and responsibility. By fostering critical thinking and creativity, LwICT helps individuals make informed decisions and contribute meaningfully to society in the digital era.

Information literacy enables individuals to understand the economic, legal, and social issues surrounding the use of information. It also raises awareness about the ethical and legal access and use of information. Furthermore, Johnson et al. (2018) highlight that digital literacy—which includes abilities like assessing sources and determining their credibility—is essential for successfully navigating the digital environment.

Access to information

The IT revolution has significantly facilitated the processes of searching for and retrieving information, enhancing the efficiency of organizational management processes and providing new ways to improve the capacity of response to users. As Kumar Bhoi (2017) notes, ICT plays a crucial role in managing knowledge—both tacit and explicit—by improving how information is created, stored, and transferred. Their academic and professional success relies heavily on their proficiency in navigating the world. In the field of communication information retrieval involves searching for news updates credible sources and multimedia content that form the foundation of creating well informed and influential media messages Ajani (2018). With the vast amount of information available on the Internet, much of it biased, misleading, or inaccurate, it is crucial to assess whether a source is reliable. Information has significant consequences when accurate, it can be life-saving, but misinformation can cause serious harm. Like a disease, false information can spread rapidly, leading to what is known as an infodemic.

Knowledge of software applications

For a computer to effectively manipulate data and produce useful output, its hardware and software must work together. Without software, computer hardware is useless. Conversely, computer software cannot be used without supporting hardware. Similarly, computer software must first be loaded into the computer's hardware and then executed. One of the important jobs of an Operating System is to manage various I/O devices, including the mouse, keyboards, etc. Ugah, Sunday, and Elugwu (2018) explain that the operating system plays a central role in managing input and output devices through a layered architecture involving user-level libraries, kernel modules, and hardware. A core design goal is device independence, where programs can interact with various devices without knowing their specific details. Operating System – I/O software is often organized in the following layers: User Level Libraries, Kernel Level Modules, and the Hardware. A key concept in the design of I/O software is that it should be device-independent, where it should be possible to write programs that can access any I/O device without specifying the device in advance (Ugah, Sunday, & Elugwu, 2018).Computer hardware is the physical parts or components of a computer, such as the monitor, keyboard, computer data storage, graphic card, sound card and motherboard. By contrast, software is instructions that can be stored and ran by hardware. Hardware is directed by the software t execute any command or instruction. A combination of hardware and software forms a usable computing system.

Cybersecurity and online privacy

According to Cloudian (2025), "Data protection signifies the strategic and procedural steps undertaken to safeguard the privacy, availability, and integrity of sensitive data". Data privacy defines who has access to data, while data protection provides tools and policies to actually restrict access to the data... Data protection signifies the strategic and procedural steps undertaken to safeguard the privacy, availability, and integrity of sensitive data, and is often interchangeably used with the term 'data security.'" This distinction is vital in ensuring both protection and privacy for sensitive data, especially in light of growing data regulations.

Additionally, Patterson (2024) emphasizes that "Cybersecurity is all about keeping computer systems and electronic data safe". Due to the growing threat of cybercrime, cybersecurity experts play a vital role in safeguarding both individuals and organizations. This underscores the growing need for robust measures to protect both data and digital environments from external threats. According to National Cybersecurity Alliance, FBI Internet Crime Center, Bolster, 20% of Gen Zers and 18% of Millennials have had their identity stolen at least once, 2.76 million cybercrime complaints reported to the FBI

from 2017-2021, 18 billion in total losses due to cybercrime from 2017-2021 and 6.95 million new phishing and scam pages created in 2021. Although college students may think of themselves as tech-savvy digital natives, 2021 research by Atlas VPN found that millennials and Gen Z were the most likely age groups to fall for phishing emails.

ICT tools for effective communication

Communication is a vital part of human interaction, and people use different methods such as sending emails, talking on the phone, or placing print advertisements in specific locations. Prabavathi and Nagasubramani (2018) assert that communication—both verbal and non-verbal dominates a substantial part of our daily lives, with estimates suggesting that more than two-thirds of our time is devoted to interaction. Written and oral communication are central in daily activities like meetings, lectures, and exams. Both forms are unique in that every word used must serve a specific purpose; otherwise, it can lead to misunderstandings. They also emphasize that over 70% of our time is spent communicating with others, making communication a fundamental aspect of human interaction that everyone must engage in.

In the 21st century, the use of Information and Communication Technology (ICT) tools has become essential in every classroom's teaching and learning processes. As Sachchidanand Prasad et al. (2024) point out, ICT has become inevitable in global exchanges, enhancing the quality of education and meeting international requirements. This usage of ICT facilitates changes and reforms that benefit its users.

ICT helps individuals and organizations keep pace with the latest developments through its various integrated technologies. One of the most important and widely accepted services of the Internet is the World Wide Web (WWW). Its popularity has surged due to its ease of use and ability to display colorful and rich content.

Ability to organize and manage information efficiently

Data management is the skill of collecting, organizing, protecting, and storing an organization's data so it can be analyzed for business decisions. As organizations create and consume data at unprecedented rates, data management solutions become essential for making sense of the vast quantities of data. Today's leading data management software ensures that reliable, up-to-date data is always used to drive decisions. The software helps with everything from data preparation to cataloging, search, and governance, allowing people to quickly find the information they need for analysis. Salesforce (2025) emphasizes that managing data effectively is the foundation for scalable analysis. Good data management practices ensure consistency, security, and accessibility—helping organizations derive customer insights and drive performance.

Over the last few decades, the constant development of cloud systems, artificial intelligence, and the Internet of Things has led to remarkable growth in collaboration with big data. As Geek for Geek Org (2024) points out, data management plays a significant role at the enterprise level to manage this complex data. It is important to understand that data management systems are essential for ensuring the smooth functioning of businesses and organizations that primarily deal with data. An efficient approach to collecting, filtering, and deploying data sets in a structured manner is necessary to achieve organizational goals and support the decision-making process. According to Simplilearn (2024), data management involves efficiently collecting, storing, and securing data, which is key to making accurate, timely decisions in any business or technical environment. Data management ensures that organizations make the most of their data resources and helps maintain the integrity and security of the information they manage. The concept of data is constantly evolving in the business world, and while it has introduced new opportunities for companies, it has also made operations more challenging. However, precise data recording, monitoring, and storing can help organizations address these challenges. Wagener (2021) emphasized that database management systems play a pivotal role in helping organizations handle large volumes of data effectively. These systems act as intermediaries between users and stored information, ensuring that data is systematically organized and easily retrievable when necessary.

ICT Technical Skills

The rapid pace of technological advancement has created increasing pressure on college students to develop relevant computer skills to remain competitive in the job market (StudyCorgi, 2023). These technical ICT competencies include the ability to use digital tools for organizing, presenting, and disseminating information. As educational and professional landscapes become more digitally oriented, students are now frequently assessed on these abilities, underlining their growing importance.

According to UNESCO (2019), evolving information and communication technologies are reshaping how knowledge is generated, accessed, and taught. These innovations are not only enhancing instructional methods and materials but also expanding access to higher education globally.

Research conducted by Händel et al. (2020) revealed gender differences in the use of digital devices, with male students tending to engage more frequently with technology than their female peers. The same study also found that many learners felt underprepared in terms of digital skills, which limited their full participation in online learning environments. Supporting this, Aristovnik et al. (2020) observed that numerous students across multiple countries lacked essential computer skills, making it difficult for them to manage their academic progress or complete technology-related tasks effectively.

Despite this, other findings suggest that most students today have access to computers and the internet, and generally possess fundamental digital competencies. As noted by Siddiquah and Salim (2017), these often include familiarity with tools such as Microsoft Word and

PowerPoint, as well as engagement in common online activities like web browsing, email communication, and social media.

Software Tools and Productivity Application

Productivity software includes a variety of applications that support users in organizing tasks, collaborating with others, managing time, and improving overall efficiency in both individual and group work settings. According to Hanna (2025), these tools enable users to create different outputs such as documents, spreadsheets, databases, and presentations. Beyond content creation, productivity software often includes features that enhance communication and workflow, including email clients, shared calendars, and team collaboration platforms.

Popular examples of these tools include integrated suites like Microsoft Office, which offers Word, Excel, PowerPoint, Outlook, and other applications that serve both academic and professional purposes. Such tools also provide functionalities to sort, visualize, and manipulate data, helping users tailor information to their specific goals and contexts.

In educational contexts, productivity tools enrich learning by incorporating interactive and visual elements such as charts, images, and activities that engage students more effectively. These tools do not just support content delivery; they enhance the lasting impact of lessons by encouraging students to apply what they've learned to real-life scenarios, thereby reinforcing both understanding and retention.

Hardware and System Integration

Lotriet, Matthee, and Alexander [9] explain that ICT competencies vary widely, encompassing essential digital skills for general users, specialized skills for IT professionals, and strategic ICT abilities for managers who leverage technology to improve organizational performance. They emphasize that ICT skill levels are not universally defined; what qualifies as a basic digital skill in technologically advanced nations may be considered more complex in countries with limited access to digital infrastructure. This highlights the importance of contextualizing ICT literacy based on a region's level of technological development.

Multimedia Creation

Multimedia content is a method of delivering information that involves the use of multiple digital elements, including text, visuals, audio clips, video footage, and interactive components. This combination of media types creates a more engaging and comprehensive way of presenting content compared to traditional formats. Multimedia is particularly effective in enhancing user experience, as it appeals to different senses and learning styles, making complex information easier to understand and remember.

Its applications span various industries, such as education, marketing, journalism, and entertainment, where dynamic and visually rich content is essential for capturing attention and delivering messages effectively. For instance, in an educational setting, multimedia can transform conventional lessons into interactive experiences that foster deeper learning and student involvement.

Moreover, the flexibility of multimedia tools allows for innovative storytelling techniques, more impactful presentations, and increased accessibility of content. By blending diverse elements into a cohesive digital format, multimedia serves as a powerful tool for both communication and knowledge dissemination in today's increasingly digital world.

3. Methodology

Research Design

This research adopted a descriptive-correlational design to assess the level of ICT information literacy and technical skills among Grade 11 students, and to explore how these skills relate to their demographic characteristics.

A descriptive-correlational approach integrates elements of both descriptive and correlational research. It aims to provide a detailed overview of a particular group or condition, while simultaneously identifying potential associations between multiple variables—without implementing any experimental manipulation.

As described by QuestionPro (n.d.), descriptive research addresses questions about "what is" by systematically observing and recording aspects of a subject, without attempting to influence it. Meanwhile, correlational research investigates the extent and direction of relationships among two or more variables through statistical methods.

In this study, no variables were manipulated; rather, data were gathered through surveys and analyzed using quantitative methods. This design was appropriate for capturing a snapshot of students' current ICT capabilities, including their ability to access information, utilize productivity software, and create multimedia content.

The correlational component of the study allowed for the examination of potential links between student demographics (such as age, gender, and academic strand) and their ICT competencies. Analytical tools including Spearman's rho and paired t-tests were used to determine if significant relationships existed. The t-test also supported an analysis of differences between information literacy and technical skill levels, offering insight into areas where educational strategies might be enhanced.

Participants of the Study

This study focuses on Grade 11 students at PHINMA Araullo University during the school year 2024–2025. The total population of Grade 11 students is 500. These students are enrolled in different strands:

Table 1. Frequency Distribution of Grade 11 students-

STRAND	f	%
ABM	121	24%
GAS	56	12%
HUMSS	110	22%
STEM	213	43%
TOTAL	**500**	**100%**

respondents

The survey was administered through Google Forms, allowing students to conveniently provide their responses online. Participation in the study was voluntary, and strict confidentiality measures were followed to ensure that all responses remained anonymous and were used solely for research purposes.

Research Site

The study was conducted in PHINMA-Araullo University main campus, Maharlika Highway Brgy. Bitas, Cabanatuan City,

Sampling

This study employed total enumeration sampling, also known as census sampling, wherein all members of the defined population were included as participants. In this case, the entire population of Grade 11 students at PHINMA Araullo University for the school year 2024–2025, totaling 500 students, was selected as the sample.

The use of total enumeration was appropriate and justified because the population size was manageable and accessible, allowing the researcher to gather data from all members without the need for sampling subsets. This method ensures a higher level of accuracy and eliminates sampling bias since every individual from the target group is represented in the study.

According to David and Sutton (2016), "total population sampling is useful when the population is small and the researcher wants to study every possible case". This approach increases the validity of the findings by encompassing the full range of variability within the population.

Materials and Instruments

This study utilized a researcher-made questionnaire as the primary data-gathering instrument to assess the information literacy and technical ICT skills of Grade 11 students. The questionnaire consisted of 55 items, with 25 questions focused on information literacy and 30 questions measuring technical ICT skills. Each sub-variable was evaluated through five (5) item questions, ensuring a comprehensive assessment of students' competencies.

The scale used for ICT information literacy in the study was designed to assess students' ability to access, evaluate, and apply information effectively. The scale for information literacy included the following categories:

1- Illiterate
2- Moderately Literate
3- Literate
4- Very Literate

1 - Illiterate: Students who selected this option were considered to have little to no ability to access or evaluate information effectively. They lacked the basic skills required to navigate or use information in a meaningful way.

2 - Moderately Literate: Students in this category demonstrated limited ability to use and understand information, but may have shown some capability in specific areas. They were able to access some information but lacked consistency in applying it effectively.

3 - Literate: Students classified as literate had a good understanding of how to access and apply information across a variety of platforms. They demonstrated a solid level of competence in evaluating and using information.

4 - Very Literate: These students were highly skilled in accessing, analyzing, and applying information across different sources and platforms. They displayed advanced proficiency in information literacy, using information effectively and efficiently.

For the ICT technical skills, the scale focused on evaluating students' proficiency in using software, hardware, and other technical tools. The categories for technical skills were as follows:

1- Not Proficient
2- Moderately Proficient
3- Proficient
4- Very Proficient

1 - Not Proficient: Students who chose this rating lacked the necessary skills to operate basic ICT tools or perform technical tasks, showing little to no proficiency.

2 - Moderately Proficient: This category indicated students who had a basic understanding of ICT tools and systems but were still developing their technical skills. They were able to complete simple tasks but lacked mastery in more complex applications.

3 - Proficient: Students in this group displayed a strong understanding and competence in using various ICT tools, including software and hardware. They were capable of completing most tasks with efficiency and accuracy.

4 - Very Proficient: These students showed advanced technical skills and were highly proficient in using ICT tools. They demonstrated exceptional knowledge and ability to perform complex tasks with ease and precision, often using ICT tools to solve problems and innovate solutions.

Instrument Validity

To ensure the validity of the instrument, the questionnaire was first validated by the research adviser, who assessed the clarity, relevance, and appropriateness of each question.

Instrument Reliability

After the validation process, a test-retest was conducted to assess the clarity, reliability, and effectiveness of the research instrument before full-scale data collection.

The respondents for the pilot test were 15 Grade 12 students who majored in Information Technology (IT) during their senior high school years. These students had prior experience in IT-related subjects, making them well-suited to evaluate the questionnaire and provide feedback on its clarity, relevance, and comprehensibility.

Data Collection

For ease of access and efficiency in data collection, the researcher administered the questionnaire using Google Forms. This digital format allowed respondents to conveniently complete the survey online, ensuring a faster and more organized data-gathering process. Google Forms also facilitated automatic data recording and analysis, reducing potential errors in manual data entry and improving the overall reliability of the collected responses.

Data Analysis

Data gathered from this study was subjected to the following statistical treatments:

Profile of the Student-Respondents

Frequency and Percentage. This statistical tool was used to determine how frequently a certain phenomenon occurred and its portion in hundredths. Specifically, it will be used to answer the first statement of the problem about the profile of the respondents.

Level of information literacy and technical skills

Weighted Mean – The weighted mean was used to determine the average level of information literacy and technical ICT skills among students. Each response was assigned a numerical value based on the Likert scale.

Relation between Student-Respondents Profile and their information literacy and technical skills

Spearman's Rank Correlation – Since this study followed a correlational research design, Spearman's rank correlation coefficient was used to assess the relationship between students' information literacy skills and their technical ICT skills. This non-parametric method helped determine whether higher proficiency in one skill set was associated with higher proficiency in the other, even when the data may not follow a linear distribution.

Conclusion

1.The demographic profile of the respondents reveals that most were 16 to 17 years old, predominantly female, from the STEM strand, and came from low-income households, having graduated from public schools. These factors collectively shape the students' exposure to and proficiency in ICT-related competencies. Age and strand influence cognitive development and technical training, while socioeconomic status and school type impact access to digital resources. These variables highlight the interplay between demographic characteristics and students' ICT skill development and information literacy.

2. Grade 11 students demonstrated a Literate level of information literacy across all five domains: access to information, use of software applications, cybersecurity awareness, digital communication, and information management. This indicates a functional but basic ability to use ICT for academic purposes.

3. Students also showed a Proficient level in technical ICT skills, particularly in using software tools, integrating hardware, and creating multimedia content. However, their proficiency remains at the intermediate level, with evident gaps in advanced functions like scripting, troubleshooting, and web development.

4. The results of the study indicate that there are significant relationships between certain demographic variables and the level of information literacy among Grade 11 students. Specifically, strand and socio-economic status were found to have consistent and meaningful correlations across all domains of information literacy, suggesting that students' academic specialization and access to digital resources greatly influence their ICT skills. Age also showed a modest but notable relationship, particularly in areas like cybersecurity awareness. These findings confirm that students' background factors play a crucial role in shaping their digital competencies, highlighting the importance of considering these variables when designing ICT-related educational programs.

5. The results of the study reveal that there is a significant relationship between students' ICT technical skills and variables such as socio-economic status, academic strand, and age. These findings suggest that students who come from higher socio-economic backgrounds, are enrolled in ICT-related academic strands, and are older tend to demonstrate stronger competencies in software use, hardware integration, and multimedia creation.

6. There is a strong and statistically significant relationship between students' information literacy and their ICT technical skills, particularly in areas related to software use and digital productivity. However, findings also indicate that students generally perform better in conceptual tasks—such as accessing, evaluating, and managing information—than in hands-on technical applications like multimedia creation and hardware integration. This suggests a noticeable gap between theoretical understanding and practical execution, emphasizing the need to strengthen students' applied ICT competencies.

7. The study proposed six targeted intervention programs aimed at enhancing both access and skill development in ICT education. These include providing Free or Subsidized Digital Resources for disadvantaged students, Cybersecurity Awareness and Digital Ethics Training, and Specialized Training on Advanced Topics such as scripting and multimedia editing. Other initiatives involve Strand-Specific ICT Curriculum Integration, a Peer Mentoring and ICT Buddy System, and a Theory-to-Practice Bridging Program to strengthen the real-world application of ICT skills.

Recommendations

1. It is recommended that schools implement age and strand specific ICT programs to better address gaps in both technical and information literacy skills. Additional support should be directed toward students from lower socioeconomic backgrounds to improve access to digital tools and internet connectivity. Public schools may benefit from targeted ICT interventions and partnerships with private sectors or NGOs to enhance their digital infrastructure. Lastly, schools should incorporate

continuous assessment and training in ICT to bridge the digital divide regardless of background.

2. School administrators and ICT teachers should design targeted training programs to enhance students' cybersecurity awareness and online privacy skills, as this area received the lowest mean among information literacy domains.

3. Curriculum developers should enhance existing ICT subject content by integrating advanced features of productivity tools, including automation, macros, and troubleshooting, which were identified as weak areas in students' technical skills.

4. It is recommended that schools develop inclusive digital literacy programs that ensure equal learning opportunities regardless of strand or socio-economic status. ICT integration should be strengthened in non-technical strands through hands-on activities and practical applications. Moreover, government and educational institutions should provide support such as free access to learning platforms, digital tools, and internet connectivity to underserved students. These efforts will help bridge the gap and ensure all learners become not just literate, but fully competent in navigating digital environments.

5. It is recommended that schools, particularly those serving students from lower socio-economic backgrounds or non-ICT strands, implement targeted support programs such as hands-on workshops, access to digital tools, and after-school ICT skill training. These initiatives should focus on enhancing students' exposure to advanced ICT applications, bridging access gaps, and ensuring equitable development of technical competencies necessary for academic success and future employment.

6. Schools integrate more hands-on ICT training into the curriculum, focusing on the practical application of technical skills through project-based learning and real-world digital tasks. Furthermore, future research can explore the use of observational methods or performance-based assessments, which may offer a more accurate measure of students' actual ICT abilities compared to self-reported survey responses.

7. The proposed intervention program should be used by the ICT faculty to improve both information literacy and technical skill alignment, ensuring that students can not only understand digital concepts but also apply them effectively in real-world academic and professional tasks.

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REFERENCES

[1] Ajani, A. (2020). Challenges to information retrieval in the digital age. *PhilArchive*. https://philarchive.org/archive/AJICTI

[2] Ariola, M. M., & Cabansag, M. G. (2020). Age and academic performance: A correlational study. *Philippine Journal of Education and Development, 6*(2), 34–42.

[3] Aristovnik, A., Keržič, D., Ravšelj, D., Tomaževič, N., & Umek, L. (2020). Impacts of the COVID-19 pandemic on life of higher education students: A global perspective. *Sustainability, 12*(20), 8438. https://doi.org/10.3390/su12208438

[4] Cloudian. (2025). Data protection and privacy: 7 ways to protect user data. https://cloudian.com/guides/data-protection/data-protection-and-privacy-7-ways-to-protect-user-data/

[5] European Commission. (2024, February 22). More than half of EU population have basic digital skills. *Eurostat*. https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240222-1

[6] GeeksforGeeks. (2024, August 14). What is data management? https://www.geeksforgeeks.org/blogs/what-is-datamanagement/

[7] Gonzales, C. E. (2019). Academic performance of senior high school students across strands. *Asia Pacific Journal of Multidisciplinary Research, 7*(1), 45–52.

[8] González Pizarro, F., López, C., Vásquez, A., & Castro, C. (2024). Inequalities in computational thinking among incoming students in a STEM Chilean university. *arXiv*. https://doi.org/10.48550/arXiv.2407.15833

[9] Greenway, K. (2018, November). What is a theory–skill gap? An exploration of the concept. *Nurse Education in Practice, 34*(1). https://doi.org/10.1016/j.nepr.2018.10.005

[10] Hanna. (2025). Productivity software. *TechTarget*. https://www.techtarget.com/whatis/definition/productivity-software

[11] Händel, M., Stephan, M., Gläser-Zikuda, M., Kopp, B., Bedenlier, S., & Ziegler, A. (2020). Digital readiness and its effects on higher education students' socio-emotional perceptions in the context of the COVID-19 pandemic. *Journal of Research on Technology in Education, 54*(2), 267–280. https://doi.org/10.1080/15391523.2020.1846147

[12] Johnson, B. K., Rosenbaum, J. E., & Deane, A. E. (2018). Health literacy and digital media use: Assessing the Health Literacy Skills Instrument – Short Form and its correlates among African American college students. *Digital Health, 4*, 2055207618770765. https://doi.org/10.1177/2055207618770765

[13] Kumar, G. T. K. (2013). Information and communication technology (ICT) literacy and competencies among professionals [PDF]. *CORE*. https://core.ac.uk/download/pdf/290486907.pdf

[14] Lokse, M., Lag, T., Solberg, M., Andreassen, H. N., & Stenersen, M. (2017). Teaching information literacy in higher education: Effective teaching and active learning. *Chandos Publishing*. https://doi.org/10.1016/B978-0-08-100921-5.00001-1

[15] Lotriet, H. H., Matthee, M. C., & Alexander, P. M. (2010). Challenges in ascertaining ICT skills requirements in South Africa. *South African Computer Journal, 46*, 38–48. https://doi.org/10.18489/sacj.v46i1.64

[16] Manitoba Education and Training. (2015). Literacy with information and communication technology (LwICT). *Government of Manitoba*. https://www.edu.gov.mb.ca/k12/tech/lict/index.html

[17] Navarro, A. M. (2024). School infrastructure in the Philippines: Where are we now and where should we be heading? *Philippine Institute for Development Studies*. https://www.pids.gov.ph/publication/research-paper-series/school-infrastructure-in-the-philippines-where-are-we-now-and-where-should-we-be-heading

[18] Patterson, N. (2024, October 30). What is cybersecurity and why is it important? *Southern New Hampshire University*. https://www.snhu.edu/about-us/newsroom/stem/what-is-cyber-security

[19] Philippine Statistics Authority. (2023). Poverty statistics: First semester 2023. https://psa.gov.ph

[20] Prasad, S., Kumar, D., & Bath, S. (2024). Using information and communication technology tools in writing skills and their functionalities. *International Journal of Educational Reform, 33*(2), 1–13. https://doi.org/10.1177/10567879241247832

[21] Raja, R., & Nagasubramani, P. C. (2018). Impact of modern technology in education. *Journal of Applied and Advanced Research, 3*(Suppl. 1), S33–S35. https://doi.org/10.21839/jaar.2018.v3iS1.165

[22] Salesforce. (2025). What is data management? Importance & challenges. *Tableau*. https://www.tableau.com/learn/articles/what-is-data-management

[23] Siddiquah, A., & Salim, Z. (2017). The ICT facilities, skills, usage, and the problems faced by the students of higher education. *EURASIA Journal of Mathematics, Science and Technology Education, 13*(8), 4987–4994. https://doi.org/10.12973/eurasia.2017.00977a

[24] Simplilearn. (2025, June 19). What is data management and why is it important. https://www.simplilearn.com/what-is-data-management-article

[25] StudyCorgi. (2023, November 15). Computer skills for college students. https://studycorgi.com/computer-skills-for-college-students/

[26] Thongsri, N., Shen, L., & Bao, Y. (2019). Investigating academic major differences in perception of computer self-efficacy and intention toward e-learning adoption in China. *Innovations in Education and Teaching International, 57*(5), 577–589. https://www.tandfonline.com/doi/abs/10.1080/14703297.2019.1585904

[27] Ugah, S., Sunday, I., & Elugwu, O. (2018). Relationship between operating system, computer hardware, application software, and other software. *International Journal of Computer Applications, 182*(35), 1–8. https://www.researchgate.net/publication/329974415_Relationship_between_Operating_System_Computer_Hardware_Application_Software_and_Other_Software

[28] UNESCO. (2019). Information and communication technology (ICT) in education. https://learningportal.iiep.unesco.org/en/issue-briefs/improve-learning/information-and-communication-technology-ict-in-education

[29] Wagener, A. (2021, February 23). What is the importance of a database management system? *MCG*. https://www.mcg.dk/post/what-is-the-importance-of-a-database-management-system