LEVELS OF INTEREST AND SELF-EFFICACY IN PURSUING THE SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS (STEM) STRAND AMONG GRADE 10 STUDENTS WITH AND WITHOUT ICT SUBJECTS

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ABSTRACT

The rapid advancement of technology has significantly influenced educational practices, highlighting the importance of integrating Information and Communication Technology (ICT) in learning. The Philippines recognized ICT integration as a crucial strategy to boost students' motivation and competence in Science, Technology, Engineering, and Mathematics (STEM). However, despite these initiatives, many students remain hesitant to pursue the STEM track due to perceived difficulty and lack of confidence. This study examined the influence of ICT exposure on Grade 10 students' interest and self-efficacy in pursuing the Senior High School (SHS) STEM track. Guided by the Expectancy-Value Theory and Self-Efficacy Theory, the study investigated how prior ICT knowledge affects students' motivation and confidence in choosing STEM-related academic pathways. A quantitative research design was employed using a 5-point Likert-scale questionnaire to collect data from Grade 10 students. The respondents were profiled according to sex and their exposure to ICT subjects. The study measured the level of students' interest and self-efficacy in pursuing the STEM track and examined whether significant differences existed based on ICT exposure and sex. Additionally, the relationship between students' interest and self-efficacy was analyzed. Results revealed that no significant difference existed between students with and without ICT exposure when grouped according to sex. Likewise, no significant difference existed between students with and without ICT exposure when compared to their levels of interest and self-efficacy. However, a significant relationship existed between levels of self-interest and self-efficacy for students with ICT exposure, while there was no significant relationship for students with no ICT exposure. Based on the results, the proposed program aimed to strengthen ICT integration and support students' readiness for STEM learning. The outcomes of this study may assist educators, school administrators, and policymakers in developing strategies to improve STEM engagement and promote technological competence among learners.

Keywords: *Information and Communication Technology (ICT), STEM education, self-efficacy, student interest, ICT exposure, senior high school STEM track.*

INTRODUCTION

In the 21st century, STEM (Science, Technology, Engineering, and Mathematics) education became a key part of global development, leading to new ideas, economic growth, and technical progress in many countries. As countries worked to stay competitive in an increasingly knowledge-based economy, global standards set by organizations such as UNESCO and the OECD stressed the need not only to develop strong cognitive skills but also to foster students' interest, confidence, and adaptability in STEM fields. Secondary education, especially at the Grade 10 level, was crucial in preparing students to meet these global standards, as they began making decisions about their academic and professional paths. At this stage, interest—defined as excitement and engagement—and self-efficacy—referring to one's belief in their ability to succeed—were among the most important factors influencing whether students choose to pursue STEM subjects. The integration of Information and Communication Technology (ICT) further aligned education with global requirements, as exposure to ICT provided students with digital literacy, problem-solving skills, and familiarity with modern technological tools needed worldwide.

Despite these global efforts, significant challenges remained in ensuring equitable access to STEM and ICT opportunities. Disparities in access to ICT and STEM-related experiences continued to create gaps in students' preparedness and confidence, which limited their ability to meet global benchmarks. Students without adequate ICT exposure often struggled to develop the competencies expected in modern education systems, which affected both their interest and self-efficacy in pursuing STEM. These issues highlighted the importance of examining how prior ICT experience influenced Grade 10 students' academic choices and readiness. In the context of the Philippines, these concerns took on greater significance, as aligning the national education system with global standards required strengthening ICT integration, improving resource accessibility, and fostering student confidence in STEM disciplines. Ultimately, addressing these gaps contributed to producing globally competitive Filipino citizens who were better equipped to participate in innovation-driven industries and national development.

In response to these global and national challenges, the Philippine government undertook major educational reforms to better prepare its learners. In 2013, former President Benigno Aquino III signed into law Republic Act No. 10533, officially titled the Enhanced Basic Education Act of 2013, which institutionalized the K–12 Program in the Philippines. This reform extended the country's 10-year basic education cycle into a K–12 curriculum, broadened students' learning opportunities, improved access to quality education, and fostered individuals capable of contributing to society, thereby enhancing the global competitiveness of the Filipino workforce (Adarlo, 2016). Under the law, kindergarten became compulsory before Grade 1, and two additional years were added to secondary education in the form of senior high school (Abulencia, 2015). These curriculum reforms emphasized student-centered, culturally responsive, inclusive, and integrative approaches designed to address challenges associated with globalization, such as poverty reduction, sustainable development, and peaceful coexistence. While the full effects of the reforms on students who completed the K–12 cycle had yet to be fully determined, the Department of Education's curriculum guides illustrated how Filipino learners were being prepared to navigate the complexities of the twenty-first century (Adarlo, 2016).When examining the link between income and education level, data showed that more individuals from low-income groups only

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finished high school. Beyond high school completion, however, higher-income groups recorded greater participation in further education. According to Okabe (2013), only 19.5% of individuals from low-income households completed high school or pursued higher education, compared to 52.8% of those from high-income households. This indicated that many individuals in the low-income bracket either completed only primary education, began but did not finish secondary education, or dropped out entirely. In contrast, individuals with higher incomes generally had better access to higher education, with many completing high school and continuing to college.

The K to 12 Program sought to address such disparities by extending basic education in the Philippines. It made kindergarten mandatory for one year and added two years to the existing four-year secondary cycle. This change brought the Philippine system in line with other Southeast Asian countries, where secondary schooling typically ends at age 17. Under the old system, which concluded at age 15, students faced multiple difficulties: overloaded curricula, disqualification from tertiary education overseas due to their younger age, and ineligibility for immediate employment since they had not yet reached the legal working age (Okabe, 2013). The K to 12 reform was thus implemented to address both educational and socio-economic challenges.

The Department of Education (DepEd) officially rolled out the Senior High School (SHS) program nationwide during School Year 2016–2017. This initiative added two more years to secondary education—Grades 11 and 12—allowing students to choose a track aligned with their skills, interests, and aspirations. The program has four main paths: academic, arts and design, sports, and technical-vocational-livelihood. Within the academic track, learners can further specialize in strands such as Accountancy, Business and Management (ABM), Humanities and Social Sciences (HUMSS), Science, Technology, Engineering and Mathematics (STEM), or the General Academic Strand (GA). The K to 12 curriculum envisions its graduates as individuals equipped with lifelong learning abilities, workplace readiness, productivity, global and local citizenship, independence, critical thinking, and a strong capacity for both personal and social transformation (RA 10533, 2013).

In 2023, former DepEd Secretary and Vice President Sara Z. Duterte introduced the MATATAG curriculum reform to decongest the K–12 curriculum by streamlining competencies and emphasizing essential skills, including literacy, numeracy, socio-emotional learning, values, and 21st-century skills, from kindergarten through Grade 3 (Bacelonia, 2023). A key component of MATATAG was the inclusion of peace competencies, which promote non-violent approaches and enhance learners' conflict-resolution abilities. Duterte highlighted that the curriculum aligns with the DepEd slogan "MATATAG: Bansang makabata, batang makabansa," reflecting its goal to produce competent, job-ready, responsible, and patriotic citizens, with "MATATAG" representing making the curriculum relevant, accelerating service delivery, promoting learner well-being, and supporting teachers (DepEd, 2024). The reform also presents an opportunity to formally integrate ICT into foundational learning for Grades 7–10, empowering Filipino students to become creators, not just consumers, of technology, thereby fostering digital literacy and preparing learners for future STEM education and careers.

Critics contend that the Senior High School (SHS) program disproportionately benefits affluent students, especially those seeking tertiary education overseas, while numerous low-income students, who anticipated improved employment prospects, continue to experience underemployment (Adarlo, 2016). SHS was supposed to make Philippine education more like education in other countries, but critics say it has not lived up to its promises of getting students ready for college and work. In response, Sen. Jinggoy Estrada filed Senate Bill No. 3001 to restore the 10-year cycle, citing that most employers and even government agencies still prefer college graduates and arguing that eliminating SHS would ease families' financial burdens (Espinosa et al., 2025). However, studies, including one from UNESCO, suggest that additional years of schooling can boost employability by up to 50% (Espinosa et al., 2025). For this reason, Education Secretary Sonny Angara advocated revising rather than abolishing K–12, with a streamlined curriculum already being piloted nationwide (Fuentes, 2025). Strengthening the SHS curriculum is the best way to make education in the Philippines better and more reliable for future generations.

Building on this need to enhance SHS outcomes, many public and private high schools in the Philippines have begun integrating Information and Communication Technology (ICT) into their curricula. The K–12 ICT standards tell teachers what students should learn and give them activities to help them practice these skills (Bonifacio, 2013). Early ICT instruction develops digital skills, critical thinking, and problem-solving, which are crucial for success in STEM careers. It also equips students with the knowledge needed to make informed decisions about senior high school strands (Mendoza & Verzosa, 2021). In SHS, the STEM strand emphasizes science, technology, engineering, and math subjects to prepare students for related careers and college programs (Agamata et al., 2018), while non-STEM strands focus on humanities, arts, and social sciences, preparing students for diverse career options. Choosing the appropriate strand is vital because students may struggle in college if their high school preparation does not align with their chosen program, leading to stress and academic delays (Formaran et al., 2022; Wencaslao, 2022; Caballes et al., 2020). Furthermore, many low-income students opt for the Technical-Vocational-Livelihood (TVL) track to enter the workforce quickly, but these jobs often do not require advanced skills like programming or robotics, which STEM offers, making the STEM strand a more advantageous option for higher education and future career opportunities (Wencaslao, 2022).

It has been demonstrated that practical ICT activities, such as robotics, coding, and project-based learning, make STEM subjects more engaging and enjoyable, thereby enhancing students' motivation and learning outcomes. More recent research confirms that incorporating ICT into foundational education (Grades 1–10) helps students overcome academic anxiety, develop confidence in using technology, and make more informed decisions about their educational pathways. For example, early and consistent exposure to digital tools has been shown to improve students' cognitive engagement and better prepare them for future academic demands, particularly in STEM-related subjects, as highlighted by UNESCO (2023). Similarly, the OECD (2021) reports that technology-supported learning environments enhance students' problem-solving skills and foster interest in STEM disciplines.

Building on this evidence, this study focuses on School A and School B as target institutions to explore the impact of ICT subjects on students' academic motivation and preparedness. By examining these two schools, the study aims to investigate how ICT integration influences Grade 10 students' self-efficacy, interest in STEM, and readiness to make informed choices regarding their senior high school tracks. Specifically, it considers how school-related factors, alongside ICT subjects, contribute to students' motivation to pursue the STEM track and their ability to navigate educational decisions effectively.

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Background of the Study

Recently, literacy has expanded beyond traditional reading and writing to include digital literacy, which emphasizes the ability to use digital devices, process information, and create online content (Baterna et al., 2020). The study said that the need for digital skills has gone up by 50%, and the number of jobs for people who are proficient with computers has gone up by 30% (STEMpedia, 2024). Despite this growing need, there was little to no research in the Philippine context on how ICT subjects and exposures in the junior high school years (grades 7 to 10) influence students' awareness, confidence, and interest in pursuing Senior High School (SHS) strands, particularly STEM. This gap highlighted the importance of exploring the relationship between having ICT subjects in junior high school and students' academic performance, including which strand to choose in senior high school and how that choice will impact their career decision-making after graduation.

In the K–12 Basic Education Program, students in the STEM Strand used ICT subjects to strengthen their knowledge in science, technology, and engineering. By 2025, ICT-related subjects such as empowerment technologies and computer-focused courses will help students learn how to use digital tools, research online, and create presentations or projects using technology. These subjects also introduced the students to important computing concepts such as algorithms, basic programming, and multimedia development. Through these lessons, students developed digital literacy, critical thinking, and problem-solving skills that are necessary for modern scientific and technological careers.

In addition, ICT subjects in the STEM track provide hands-on learning in areas like programming, computer systems, and robotics. Students studied topics such as computer hardware, networking, web design, and coding, which allow them to build and understand digital systems. Some schools also integrated robotics and technology projects to help students apply their knowledge of electronics and programming in real-world situations. These activities prepared learners for future studies in fields such as computer science, engineering, and information technology while also equipping them with practical technical skills for the modern digital economy.

Grade 10 students were at a pivotal stage of choosing an SHS track, yet many face uncertainty about their capabilities in STEM subjects. ICT can help close this gap by improving students' digital literacy and boosting their motivation, confidence, and problem-solving skills at the same time (Lioenko & Huzar, 2023). However, access to ICT resources in the Philippines was highly unequal. Well-resourced private schools and select public schools provide hands-on opportunities in programming, robotics, and digital content creation, whereas many public schools—especially in rural areas—offer limited or outdated facilities (Mendoza & Verzosa, 2021), which can hinder students' ability to develop essential skills for the modern workforce. This difference made the digital gap bigger. Students who did not get enough exposure were more likely to think STEM was hard and stay away from it altogether (Salandanan, 2020).

ICT subjects played a vital role in modern education by helping students develop advanced technological and digital skills that are essential in today's world. Students learned how computers operate, how to create software, and how digital systems communicate in ICT classes. One important part of ICT is programming, where students learned to write instructions that tell computers what to do. Programming languages such as Python and Java helped students understand logical thinking, problem-solving, and how applications and websites were developed. These skills prepared learners for careers in fields such as software development, data science, and cybersecurity.

Another important area of ICT education was robotics and automation. Robotics allowed students to design, build, and program machines that can perform tasks automatically. By working with robotics platforms such as LEGO Mindstorms and Arduino, students learned how hardware and software work together. They gained hands-on experience with sensors, motors, and coding, which encourages creativity, engineering thinking, and teamwork. Learning robotics and programming strengthens technical knowledge and prepares students for future industries where artificial intelligence, automation, and digital technologies are increasingly important.

This study seeks to address this gap by examining the influence of ICT subjects on Grade 10 students by comparing their self-efficacy and interest in taking the STEM tracks. Grounded in Self-efficacy Theory (Bandura, 1977) and Expectancy-Value Theory (Eccles & Wigfield, 2002), this research proposes an ICT program designed to raise awareness of SHS track options across all strands while equipping students with the confidence and motivation to make informed decisions about their future careers. This proposed program wants the students to see technology as more than just a fun thing to do. Students need to see the importance of doing well in school, learning essential skills, and exploring STEM careers.

The demand for STEM professionals continued to grow as industries increasingly rely on science, technology, engineering, and mathematics to drive innovation and economic development. Fields such as information technology, engineering, biotechnology, and data science required skilled workers who could develop new technologies, solve complex problems, and improve modern systems. As automation, AI, and digital transformation become more common, businesses need people who know how to program, build robots, and use advanced scientific methods. Education programs like the STEM strand in the K–12 system aimed to prepare students with the knowledge and technical skills required to meet this growing global demand and contribute to technological progress and national development.

MATATAG Curriculum and ICT Integration

The Department of Education’s (DepEd) MATATAG Curriculum, implemented in School Year 2024–2025, aims to enhance K–10 education by strengthening core literacies and 21st-century competencies, with a particular focus on digital literacy and Information and Communication Technology (ICT) skills (DepEd Order No. 010, s. 2024; DepEd Order No. 012, s. 2024). Aligned with the Basic Education Development Plan (BEDP) 2022–2030, the curriculum emphasizes ICT integration as a strategy to address learning gaps, improve educational quality, and promote equity across schools.

In the context of STEM education, ICT tools—including programming, robotics, instrumentation, and data analysis—played a vital role in fostering critical thinking, problem-solving, and analytical skills, all of which are essential for students pursuing careers and higher education in science, technology, engineering, and mathematics (Bonifacio, n.d.; Montemayor, 2018). When teachers effectively integrate technology in the classroom, students can engage in simulations, virtual laboratories, and data-driven projects that promote experiential learning rather than rote memorization. Such practices not only deepen conceptual understanding but also increase learners’ engagement with complex STEM concepts.

The revised Edukasyong Pantahanan at Pangkabuhayan/Technology and Livelihood Education (EPP/TLE) curriculum of 2018 further complements ICT

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integration through project-based learning, robotics programs, and improved internet connectivity, which is projected to cover 78% of public schools by 2025 (Academ-e, 2023; Villanueva, 2025). Research demonstrates that meaningful ICT engagement significantly enhances students' motivation, level of interest, and self-efficacy in STEM subjects, equipping them with both technical and cognitive skills necessary for higher education and technology-driven careers. Students who perceive themselves as capable of using ICT tools tend to develop stronger confidence in handling STEM-related tasks, which increases their likelihood of pursuing the STEM strand in senior high school.

ICT integration also supports learner-centered approaches by letting students learn on their own, work with others, and use what they know to solve real-world problems. These opportunities contribute to higher levels of academic self-efficacy, as learners begin to view themselves as active problem-solvers capable of mastering challenging STEM concepts. Also, having ICT resources makes lessons more interactive, relevant, and fun, which makes students more interested.

Through these strategies, the MATATAG Curriculum builds digital literacy and encourages students to develop the confidence, creativity, and critical thinking skills necessary to succeed in 21st-century STEM pathways (UNESCO, 2023; OECD, 2021). More importantly, it strengthens students' self-belief and sustained interest in STEM by integrating ICT as both a learning tool and a motivational driver (UNESCO, 2023). By bridging socio-economic disparities in access to technology and quality education, the curriculum ensures that learners from diverse backgrounds are given equal opportunities to cultivate the interest and self-efficacy needed to thrive in STEM-related fields (OECD, 2021).

Awareness and Preparedness of Senior High School

Recent studies have stressed how important it was for high school seniors to be informed and ready, especially in locations that are likely to have disasters. Awareness means that pupils know about and understand possible dangers, while preparation means that they know how to act quickly in an emergency. Nurvianti et al. (2021) found that most senior high school students were somewhat ready for disasters, with about 74% of them being ready, but there were still some gaps in readiness. In a similar study, Baldomar (2024) discovered that although students were generally cognizant of disaster threats, many did not possess a comprehensive understanding of specific protocols, including evacuation methods and standards for school suspension during emergencies. This indicates that mere awareness was inadequate without the cultivation of real readiness abilities.

Recent literature was extensively examined the correlation between awareness and readiness. Inocian et al. (2025) found a strong positive link between disaster awareness and readiness. This means that pupils who know more about disasters are more likely to act appropriately when something bad happens. Other studies show that students who know more about dangers and safety can better handle disasters. So, raising awareness was an important step in getting senior high school students ready for anything.

Moreover, disaster education and school-based initiatives were essential in enhancing both awareness and preparedness. Wang et al. (2023) discovered that incorporating disaster education into the curriculum markedly enhances students' protective behaviours and preparedness. Drills, simulations, and planned courses were examples of educational interventions that have been found to help pupils understand how to respond to emergencies and feel more confident doing so.

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Innovative teaching methods, such as learning through simulation, have also been shown to help students become more engaged and knowledgeable about disasters (Frontiers in Education, 2025). These results show how important it was to keep learning in a way that is both ongoing and interactive to get people ready for disasters.

Even with these beneficial changes, there were still some problems. Studies show that pupils typically only have a surface-level understanding of emergency procedures and warning systems and may not fully understand them (Baldomar, 2024). Also, a lack of resources, insufficient training, and inadequate support from the institution might reduce the effectiveness of preparedness programs. These obstacles showed that schools need to strengthen their programs for reducing catastrophe risks and give students more chances to learn.

ICT Integration, Student Profile, and STEM Inclinations

The incorporation of Information and Communication Technology (ICT) into education has become a major influence on students' academic choices, notably in the choosing of Science, Technology, Engineering, and Mathematics (STEM) courses. According to the Department of Education (2021), students' demographics, such as gender, continued to impact their academic interests, with male students traditionally demonstrating greater engagement in STEM disciplines. However, the increased incorporation of ICT into the curriculum helped close the gap by ensuring equitable access to digital learning possibilities. Similarly, the Philippine Institute for Development Studies (2022) discovered that exposure to ICT-related topics in junior high school favorably influenced students' inclinations to pursue STEM careers. The Commission on Higher Education (2023) stressed that early ICT exposure increased students' preparation and familiarity with STEM abilities, boosting their confidence in pursuing related disciplines.

On a global scale, organizations such as UNESCO (2021) emphasized that ICT integration was critical in minimizing gender gaps in STEM education by encouraging inclusion and involvement among female students. Similarly, the OECD (2022) found that pupils exposed to ICT had a better tendency toward STEM, regardless of gender, while certain variations persisted. The World Bank (2020) stated that ICT exposure improved students' employment preparedness and impacted their academic path choices.

The study's results were corroborated by Chan and Mohammad's (2024) research, which found that incorporating ICT into STEM instruction increased students' involvement and enthusiasm in science-related disciplines. Their research found that the usage of digital tools and platforms helped students explore complicated topics more interactively, enhancing their enthusiasm to pursue STEM careers. Furthermore, ICT-based education was shown to foster a more inclusive learning environment, promoting involvement from both male and female students. This confirmed the current finding that ICT integration reduced gender differences in STEM choices. Furthermore, their studies indicated that exposure to ICT-rich surroundings improved students' problem-solving abilities, which were critical in STEM subjects. As a result, ICT integration played an important role in developing students' academic interests in STEM fields.

Similarly, Syahrir et al. (2024) discovered that incorporating ICT into STEM education greatly enhanced both teaching methods and student learning results. Their systematic evaluation found that ICT improved instructors' capacity to conduct successful lectures, making STEM disciplines more accessible and engaging for students. Furthermore, the research demonstrated that early exposure to ICT stimulated pupils' curiosity and developed the core abilities required for STEM learning. This was consistent with the existing results that ICT exposure in junior high school increased students' inclinations to pursue STEM careers. The researchers also found that integrating ICT made learning fairer for everyone, which helped close the gap between boys and girls in STEM fields. Thus, ICT helped pupils perform better in school and affected their career choices.

In support of this, Badruzzaman Biplob et al. (2025) found that students with strong ICT backgrounds performed better in university-level STEM programs. Their results implied that previous exposure to ICT disciplines improved students' preparedness and confidence in dealing with advanced STEM issues. Furthermore, the research found that ICT abilities established in earlier stages of school had a considerable influence on students' academic achievement in STEM subjects. This lent credence to the argument that ICT integration boosted students' self-efficacy and readiness for STEM-related careers. The researchers also noted that students who were comfortable with digital technologies were more likely to pursue STEM fields. As a result, students' ICT exposure had a significant impact on their academic and professional paths.

Macharia (2022) corroborated these results, suggesting that ICT integration increased learners' academic performance in STEM courses. The research found that technology-based interventions improved comprehension of challenging ideas, which increased student interest in STEM fields. Furthermore, ICT was shown to enhance individualized learning, enabling students to study at their pace and level. This correlated with better student engagement levels, regardless of gender. The data also revealed that ICT integration promoted a positive learning environment, encouraging students to pursue STEM-related employment. Thus, ICT was a powerful instrument for influencing students' academic choices and increasing their performance.

Furthermore, Yang et al. (2025) demonstrated a strong correlation between students' ICT usage patterns and academic success, particularly in STEM-related fields. Their research on PISA 2022 data showed that pupils who regularly utilized ICT for educational purposes performed better academically. The research also found that ICT exposure improved analytical and critical thinking abilities, which were necessary for success in STEM. This validated the current results that ICT integration improved students' preparation and inclination for STEM fields. Furthermore, the researchers found that using ICT reduced inequities among students by ensuring equitable access to learning materials. As a result, ICT had a significant impact on academic achievement as well as subject choices.

Sumiati et al. (2025) noted that students who participated in STEM learning settings with ICT integration had greater levels of technology and engineering literacy. Their research contrasted STEM and non-STEM learners and found that individuals who received ICT-rich STEM education had higher problem-solving and innovation skills. This lent credence to the assumption that ICT exposure improved students' familiarity with STEM-related abilities. Furthermore, the research found that ICT integration motivated students to pursue STEM by giving them more confidence in performing technical tasks. It was also found that ICT helped reduce skill gaps among pupils. Therefore, ICT acted as a bridge between students' learning experiences and STEM career paths.

Lukychova et al. (2022) highlighted ICT as a crucial motivator for boosting STEM education and aligning it with current educational trends. Their findings emphasized how incorporating ICT into the curriculum modernized the learning process and made STEM courses more relevant to students. Furthermore, ICT was

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shown to improve student collaboration and innovation, both of which were critical skills in STEM professions. This was consistent with current research, which showed that ICT integration increased students' motivation and preparation for STEM programs. The researchers also stated that ICT promoted equitable learning opportunities, thereby minimizing gender gaps. As a result, ICT integration was critical in preparing students for future STEM-related employment.

Finally, the research "Evaluating the Effectiveness of ICT Integration in Teaching and Learning" (2023) found that ICT played an important role in increasing student engagement and academic performance. The results demonstrated that ICT-based learning environments promoted active participation and self-directed learning among students. Furthermore, the research found that ICT supported differentiated instruction, which catered to diverse learning needs. This was consistent with recent findings indicating that ICT integration influenced students' academic choices and interests. It also emphasized how ICT provided a supportive learning environment that helped students gain confidence in STEM disciplines. Overall, ICT integration was an effective strategy for shaping students' academic choices and reducing gaps in STEM education.

ICT Integration and Students' Interest in STEM

According to the Department of Education (2022), ICT-enhanced education improved student involvement and motivation, especially in science and mathematics disciplines. This showed that incorporating digital technologies into classroom teaching increased learners' active participation in the learning process. Engagement was an important aspect since it directly affected how students viewed and appreciated STEM courses. The utilization of multimedia presentations, simulations, and interactive platforms made abstract topics more tangible and intelligible. Therefore, pupils were more likely to have positive opinions of STEM topics. Finally, this greater drive led to a higher desire to take STEM courses in senior high school and beyond.

Supporting this, the Philippine Institute for Development Studies (2023) discovered that pupils who had been exposed to digital tools such as coding platforms and simulations were more interested in STEM jobs. These technologies provided students with real-world applications of scientific and mathematical principles, making learning more engaging. Coding and simulations also enhanced problem-solving and critical thinking abilities, which were essential in STEM disciplines. Furthermore, such experiences allowed students to envision future career routes in technology and engineering. Early exposure had a significant impact on students' academic goals and future choices. Thus, including ICT tools in education had a substantial impact on students' long-term interest in STEM careers.

Local studies complemented these results by demonstrating that students who received ICT-integrated education were more enthusiastic and eager to pursue STEM careers. ICT integration promoted a more participatory and student-centered learning environment, encouraging curiosity and inquiry. Students gained confidence in their abilities as they interacted with digital learning materials. This confidence enhanced their self-efficacy in mastering challenging concepts in STEM. Furthermore, ICT exposure gave students access to a greater variety of knowledge, improving their understanding of STEM areas. As a result, students with ICT expertise were more likely to choose STEM-related academic courses.

On a worldwide scale, UNESCO (2023) stressed that ICT-based teaching practices promoted learners' interest and involvement. Curiosity was a primary

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motivator of interest, particularly in STEM education, where research and experimentation were critical. ICT technologies, such as virtual experiments and interactive modules, inspired students to ask questions and investigate subjects on their own. This method turned learning from passive to active, making it more efficient and engaging. Furthermore, ICT promoted collaborative learning via online platforms and shared digital environments. Therefore, students acquired a deeper and longer-lasting interest in STEM disciplines.

Similarly, the OECD (2021) found that pupils who often utilized digital devices were more interested in STEM-related topics. Regular engagement with technology increased students' knowledge and comfort with digital tools, which were essential in modern STEM subjects. This familiarity decreased fear and increased confidence when dealing with complicated technical topics. Furthermore, internet exposure helped students develop important skills like data analysis, coding, and digital literacy. STEM occupations highly valued these qualities, encouraging students to pursue them. Thus, regular usage of ICT had a major impact on students' interest in STEM education.

Recent worldwide research from 2022 to 2025 demonstrated the efficiency of interactive ICT tools in increasing students' STEM interest. Syahrir et al. (2024) found that ICT integration improved teacher competence and student participation in STEM learning. Similarly, Benek and Dönmez (2024) discovered that integrated STEM activities facilitated by ICT greatly increased students' enthusiasm and perceptions of STEM. Zhang and Zhu (2025) found that positive attitudes toward ICT among instructors enhanced students' learning experiences and enthusiasm in STEM.

Furthermore, Eksail (2024) found that ICT usage improved students' performance and attitudes toward scientific courses. Macharia (2022), Xu and Wang (2025), Le et al. (2023), and Lukychova et al. (2022) all found that technologies such as virtual labs and gamified platforms increased engagement and interest in STEM pathways. These tools provided immersive and hands-on learning experiences, making STEM courses more interesting. They also promoted individualized learning, which allowed students to progress at their pace. Overall, the data demonstrated that interactive ICT tools played an important role in improving students' interest and involvement in STEM classes.

ICT Integration and Students' Self-Efficacy in STEM

The Department of Education (2021) underlined that incorporating ICT into classroom education boosted students' self-efficacy, especially in science and mathematics. ICT-supported learning settings included interactive tools and simulations that enabled students to practice problem-solving in a low-risk, engaging environment. These experiences provided students with confidence in their capacity to perform complex tasks independently, strengthening their belief in personal competence. The research found that students who had been exposed to ICT were more inclined to undertake difficult STEM challenges without fear of failure, indicating increased resilience. Furthermore, ICT integration promoted a learner-centered approach that stimulated discovery and experimentation, both of which were essential for increasing self-efficacy. Overall, the results indicated that ICT helped students understand content and improved their psychological readiness to engage in STEM learning.

According to the Commission on Stronger Education (2022), students who used ICT daily had stronger academic self-efficacy, particularly in STEM courses. ICT-based educational tools, such as interactive simulations, coding platforms, and virtual

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laboratories, provided hands-on experiences that helped students strengthen their problem-solving skills. By actively interacting with these technologies, students gained confidence in their abilities, which improved their motivation and persistence in STEM tasks. The research also found that ICT integration helped overcome gaps in prior knowledge by allowing students to progress at their pace. Importantly, the development of self-efficacy through ICT was associated with a greater inclination to pursue STEM-related courses and career options. These results highlighted the importance of ICT in promoting both cognitive and emotional development in education.

Syahrir et al. (2024) conducted a comprehensive study to demonstrate how ICT integration in primary STEM education improved teacher competence and student self-efficacy. Their results indicated that ICT tools promoted active learning by allowing students to participate meaningfully in STEM projects and improve problem-solving abilities. The research stressed that repeated, scaffolded ICT experiences boosted students' confidence in understanding difficult concepts. Furthermore, ICT promoted self-directed learning, enabling students to monitor their progress and develop a sense of agency. The authors noted that teacher facilitation was critical in maximizing the self-efficacy benefits of ICT, as instructors guided meaningful interactions with technology. Overall, the study suggested that ICT served as both an educational and motivational tool for developing STEM self-efficacy at the elementary level.

Afari et al. (2023) investigated the relationship between computer self-efficacy and ICT integration in education and found substantial evidence of a positive impact. Their findings showed that students who were more confident in using digital tools were more likely to benefit from ICT-supported learning environments. ICT integration bridged the gap between technological skills and academic success, increasing students' confidence in their ability to excel in STEM tasks. The study also emphasized the importance of structured ICT activities in promoting mastery experiences, which were essential for self-efficacy development. Furthermore, collaborative ICT activities encouraged peer learning and collective problem-solving, which enhanced confidence. These results indicated that both access to ICT tools and students' perceived competence in using them were important in building STEM self-efficacy.

Huang et al. (2020) examined young students' technological self-efficacy through the lens of social cognitive theory, focusing on its influence on STEM attitudes. Their research demonstrated that early exposure to technology increased students' confidence in their ability to perform STEM-related tasks successfully. Students gained mastery experiences when engaging with digital learning tools, which served as a foundation for self-efficacy. The study emphasized the importance of teacher guidance and social support in maintaining positive perceptions of competence. Furthermore, students with higher technological self-efficacy were more motivated to engage in STEM activities and overcome challenges. The research highlighted the connection between digital competence, confidence, and positive STEM engagement in early education.

Luo et al. (2021) developed and validated a survey to assess elementary students' self-efficacy in STEM activities, highlighting the importance of ICT experiences. Their results indicated that structured ICT-based activities significantly boosted students' confidence in solving science and mathematics problems. Self-efficacy gains were especially evident when students engaged in problem-solving simulations that provided immediate feedback. The research also found that ICT promoted independence and persistence, allowing students to take control of their learning. Furthermore, positive ICT experiences enabled students to approach new

STEM challenges with confidence and reduced anxiety. Overall, the study demonstrated that ICT use was an effective strategy for enhancing elementary students' STEM self-efficacy.

Birney and McNamara (2024) examined how participation in a STEM + Computer Science program influenced students' self-efficacy and confidence in technical skills. Their findings showed that hands-on projects and real-world problem-solving activities significantly increased students' confidence in their abilities. By integrating ICT tools into meaningful, community-based STEM projects, students gained mastery experiences, which translated into greater academic confidence. The study emphasized the importance of authentic learning experiences in developing both cognitive skills and self-efficacy. Furthermore, collaboration in these ICT-supported activities enhanced peer learning and collective problem-solving abilities. The authors suggested that structured, ICT-based STEM programs helped students build confidence and prepare for higher education.

Misol and Lajium (2025) conducted a comprehensive review of self-efficacy in STEM-TPACK instruction, focusing on the role of ICT. Their findings demonstrated that teachers' use of ICT tools had a direct impact on students' self-efficacy in STEM activities. The study highlighted that mastery experiences facilitated by technology, such as simulations and interactive modules, increased students' confidence in their abilities. Continuous opportunities to engage in digital problem-solving activities further strengthened students' confidence. Additionally, the study emphasized that ICT enhanced metacognitive skills, enabling students to monitor and regulate their learning. Overall, the research confirmed that ICT-based instruction played a crucial role in developing STEM self-efficacy among both teachers and students.

Hori and Fujii (2021) analyzed the effects of ICT use on self-efficacy and persistence using PISA 2018 data. Their findings revealed that students who used ICT for learning were more confident in their academic performance. ICT provided interactive and adaptive learning experiences that enabled students to solve complex problems while receiving immediate feedback, thereby enhancing self-efficacy. The study also found that ICT encouraged persistence, as students were more willing to try again despite challenges when supported by digital tools. Furthermore, ICT-based collaborative activities promoted peer learning and social reinforcement of competence beliefs. The results suggested that well-planned ICT integration improved both cognitive and motivational aspects of learning, supporting sustained engagement in STEM education.

Individuals' confidence in their abilities influenced their motivation, effort, and persistence in challenging situations. Recent studies conducted between 2020 and 2025 used this theoretical framework to explain how ICT-rich environments enhanced students' academic confidence. For instance, Huang et al. (2020) found that positive experiences with technology significantly improved students' technological self-efficacy and attitudes toward STEM subjects. Similarly, Luo et al. (2021) developed validated instruments that demonstrated how integrating ICT into education enhanced students' self-efficacy in STEM tasks.

International organizations also emphasized the importance of ICT in strengthening students' confidence and persistence in STEM education. UNESCO (2022) highlighted that ICT integration promoted learner-centered approaches that allowed students to explore, model, and visualize complex ideas, thereby increasing their confidence. Similarly, the OECD (2023) reported that students who frequently used digital technologies for learning had higher self-efficacy and were more likely to persist in STEM-related tasks. These findings suggested that technology-rich

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environments supported both academic achievement and the psychological readiness required for success in STEM fields.

Empirical studies supported the positive relationship between ICT use and self-efficacy. Afari et al. (2023) found a significant relationship between computer self-efficacy and effective ICT integration, indicating that students who were comfortable using digital tools were more confident in handling academic challenges. Additionally, Birney and McNamara (2024) reported that participation in ICT-supported STEM programs significantly increased students' confidence in their technical and scientific abilities. This was supported by Hori and Fujii (2021), who presented evidence from large-scale international assessments showing that ICT use in learning enhanced students' self-efficacy and persistence. More recent analyses, such as those conducted by Misol and Lajium (2025), concluded that ICT-based instruction consistently improved learners' confidence and readiness to engage in STEM-related activities.

ICT integration had a significant impact on students' self-efficacy in STEM education. Digital technologies supported students' confidence in their abilities by providing interactive experiences, immediate feedback, and opportunities for independent learning. This increased self-efficacy led to greater persistence, improved academic performance, and a higher likelihood of pursuing STEM-related academic and career pathways.

Sex-based differences in interest and self-efficacy

Differences in students' motivation and self-efficacy in STEM based on gender were widely studied in both local and international literature, with a focus on the increasing role of ICT in minimizing gender inequities. According to the Department of Education (2022), male students had historically shown a greater initial interest in STEM-related areas. However, the use of ICT in classroom education resulted in more inclusive and engaging learning environments, helping to reduce these disparities. Local studies also indicated that when female students were exposed to ICT-based learning, their self-efficacy increased dramatically, allowing them to reach equivalent, if not greater, levels of confidence in STEM topics than male students.

International literature backed up these local results by emphasizing the significance of technology in fostering gender equality in education. UNESCO (2021) highlighted ICT as a vital instrument for closing the gender gap in STEM by ensuring equitable access to learning materials and opportunities. Similarly, the OECD (2022) found that gender inequalities in STEM interest and self-efficacy tended to decrease in ICT-enriched educational contexts. This showed that digital learning settings might eliminate old prejudices and foster equitable engagement among all students, regardless of gender.

Recent empirical investigations from 2022 to 2025 supported these findings. For example, Wang et al. (2024) used structural equation modeling to investigate gender variations in high school students' interest in STEM occupations. Their results found that male students showed a greater level of initial interest in STEM-related occupations than female students. However, the research also indicated that external variables such as learning settings and instructional styles could alter this disparity. The researchers discovered that exposure to supportive and technology-enhanced learning environments greatly increased female students' interest in STEM. The research also found that self-efficacy was a mediating factor in changing students' job preferences, particularly among female learners. These results provided credence to

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the hypothesis that ICT integration might assist in reducing gender gaps by increasing interest and confidence in STEM disciplines.

Dohn (2022) investigated the organization of teenagers' interest in science from a gender standpoint. The research discovered that male and female students had different preferences for scientific subjects, with males preferring technical and physical sciences and females preferring life and social sciences. Despite these variations, the study found that interest was highly variable and could be influenced by contextual and educational variables. The research also found that inclusive and engaging teaching practices might widen students' interests beyond typical gender roles. Furthermore, Dohn observed that when students were exposed to interactive and technology-supported learning situations, gender disparities tended to lessen. This showed that ICT integration was critical for increasing balanced and inclusive interest in STEM.

Rodríguez-Esteban and Padín García (2022) examined whether gender stereotypes continued to impact academic and professional goals. Their results indicated that conventional gender stereotypes continued to influence students' selections, especially in STEM professions. Male students were more likely to pursue jobs in engineering and technology, while female students preferred non-STEM areas. However, the research revealed a significant shift in these trends as educational methods evolved, and students encountered a wider range of learning opportunities. The authors emphasized that equality-promoting activities, including the use of ICT, might challenge and diminish these preconceptions. Therefore, students of both genders were more willing to choose non-traditional professional options. This brought attention to the role of ICT in developing fair learning settings that encouraged equal interest and involvement in STEM.

Chan (2022) presented a social cognitive viewpoint on gender differences in self-efficacy, interest, and goals in STEM. The research stressed that cultural expectations and gender norms had a substantial impact on students' perceptions of their abilities. Female students often expressed lower self-efficacy in STEM due to cultural preconceptions, even if their performance was equivalent to that of male students. However, Chan emphasized that supportive learning settings might mitigate these unfavorable judgments. The use of ICT was found to be an effective method for boosting students' confidence by offering interactive and self-paced learning opportunities. Furthermore, the research found that increasing exposure to technology promoted female engagement in STEM disciplines. This ultimately helped address gender differences in self-efficacy and interest.

Sanders et al. (2024) examined co-educational and all-female informal STEM learning contexts. Their results revealed that female students in all-female settings had greater levels of self-efficacy and engagement than those in mixed-gender contexts. According to the research, reduced social pressure and improved peer support contributed to this outcome. However, the researchers emphasized that well-designed co-educational settings, especially those reinforced with ICT, might provide comparable results. Studies showed that technology-based learning tools increased cooperation, involvement, and confidence among all students. In addition, ICT contributed to the creation of inclusive environments with minimal gender prejudice. This suggested that digital learning settings might successfully promote the equitable development of interest and self-efficacy in STEM, regardless of gender.

Differences in interest and self-efficacy based on ICT exposure

The Commission on Higher Education (2023) stressed the need to include ICT disciplines in the curriculum when educating students for STEM-related careers. It highlighted that ICT courses provided learners with the fundamental digital capabilities required for advanced scientific and technical study. These skills included problem-solving, data analysis, and familiarity with digital technologies widely used in STEM fields. Consequently, pupils gained confidence in completing challenging academic activities linked with STEM. The research also found that early exposure to ICT improved pupils' preparedness and adaptability to higher STEM instruction. Finally, ICT disciplines served as a bridge for learners, increasing both curiosity and self-efficacy.

Similarly, the Department of Education (2021) discovered that incorporating ICT into classrooms boosted students' interest and confidence in studying. The research found that interactive and technology-based training improved class engagement and meaning. This enhanced involvement motivated pupils to actively participate in STEM-related activities. Furthermore, ICT technologies provided instant feedback, allowing pupils to gain confidence in their abilities. The survey also stated that learners who were exposed to ICT were more likely to acquire favorable attitudes toward difficult topics such as mathematics and physics. As a result, ICT integration greatly increased interest and self-efficacy in STEM fields.

Local studies indicated that ICT exposure enhanced pupils’ engagement levels and fostered a stronger interest in STEM. These studies showed that ICT-rich settings encouraged active learning and cooperation among students. Simulations, virtual laboratories, and interactive platforms enabled learners to investigate topics. Such experiences helped them comprehend and enjoy STEM topics better. Students gained a sense of competence when they effectively used technology to achieve academic assignments. Overall, ICT exposure promoted passion and confidence, both of which were necessary for pursuing STEM careers.

On a global scale, the World Bank (2021) found that ICT integration greatly enhanced educational results. The research noted that technology-enhanced education helped pupils develop critical thinking and digital skills that were required in modern occupations. These skills were especially important in STEM careers, where inventiveness and technical expertise were required. Furthermore, ICT access allowed students to interact with varied learning materials outside of conventional classrooms. This exposure broadened their understanding and fostered an interest in STEM disciplines. Therefore, ICT played an important role in preparing students for future STEM jobs.

UNESCO (2022) and the OECD (2023) discovered that ICT-rich learning settings improved academic achievement and perseverance. According to their results, students who often used ICT in the classroom acquired better problem-solving and analytical abilities. These abilities were critical for success in STEM education. Furthermore, ICT promoted individualized learning by enabling students to investigate subjects at their pace. This autonomy boosted their confidence and willingness to pursue challenging academic paths. As a result, ICT integration encouraged long-term interest and dedication to STEM careers.

Yu, H. and Hu, J. (2022) discovered that ICT self-efficacy and curiosity had a moderating influence on students' academic performance. Their research found that students with greater ICT confidence were more likely to develop a strong interest in digital and STEM-related activities. This relationship helped explain disparities in academic engagement among students. The results also indicated that increasing ICT

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self-efficacy might lessen gaps in learning outcomes. Furthermore, students who enjoyed using technology were more likely to pursue challenging subjects. Thus, ICT attitudes had a major impact on both interest and perseverance in STEM.

Similarly, Chen, X., and Hu, J. (2020) found that ICT-related behavioural characteristics moderated the relationship between ICT interest and self-efficacy. Their cross-national research found that students who used ICT regularly gained more confidence in their abilities. This confidence, in turn, fuelled their interest in technology-oriented subjects. The research also found that continuous ICT usage enhanced skill mastery. As students developed competence, they were more likely to pursue STEM-related coursework. As a result, ICT involvement played an important role in increasing both interest and self-efficacy.

Mandal, S. (2020) investigated the association between ICT exposure and academic self-efficacy in adolescents. The results suggested that students with greater ICT exposure were more confident in their academic abilities. This increased self-efficacy was associated with better academic achievement. The report also stressed how ICT allowed for independent and self-paced learning. These opportunities enabled students to develop mastery of complex subjects. As a result, ICT exposure had a positive impact on both academic performance and interest in STEM disciplines.

Mensah, C. et al. (2023) investigated ICT attitudes and self-efficacy among university students. Their results indicated a strong correlation between positive ICT attitudes and higher self-efficacy levels. Students who perceived ICT as useful and accessible were more likely to use it for academic purposes. This confidence led to greater participation in STEM-related activities. The research also found that addressing gender inequities in ICT might increase self-efficacy. Overall, ICT influenced students' confidence and academic orientation.

Hori, R., and Fujii, M. (2021) revealed that using ICT for learning had a significant influence on students' self-efficacy and perseverance. Their research on the PISA 2018 results showed that students who actively used ICT were more likely to persist in challenging tasks. Persistence was essential for success in STEM education. The research also found that ICT supported continuous learning through access to diverse resources. As students overcame learning challenges, their confidence increased. Thus, ICT usage enhanced resilience and interest in STEM careers.

Haselmeier, K. et al. (2019) investigated students' interest in computer science and self-concept at the secondary level. The researchers discovered that early exposure to ICT-related courses had a significant impact on students' interest in technology fields. Students with a positive self-concept were more likely to pursue STEM careers. The study also stressed the importance of fostering interest during the early stages of education. ICT experiences helped students view themselves as capable learners in technical domains. As a result, early ICT exposure was crucial for developing STEM aspirations.

Finally, the research titled "ICT Interest and ICT Self-concept as Determinants of Adolescents' Vocational Choices" (2024) emphasized the importance of ICT interest and self-concept in career decision-making. It found that students with a strong interest in ICT were more likely to pursue STEM careers. The research also found that self-concept influenced students' confidence in technical fields. ICT exposure was identified as a key factor in fostering interest and self-belief. Furthermore, the study found that these factors helped reduce gender disparities in STEM. Overall, ICT played a significant role in shaping students' career pathways in STEM.

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The Relationship Between Interest and Self-Efficacy

Both domestic and international literature had well documented the link between students' level of interest and self-efficacy in studying STEM. Local studies conducted between 2020 and 2024 regularly showed a substantial positive association between these characteristics, indicating that pupils with greater confidence in their abilities were more likely to develop a long-term interest in STEM fields. The Department of Education (2022) and the Commission on Higher Education (2021) both emphasized that self-efficacy was an important factor in students' academic choices, particularly when deciding whether to pursue STEM-related tracks. These findings demonstrated that confidence in one's ability to accomplish academic tasks had a significant impact on students' motivation and engagement.

International research reinforced this relationship by situating it within established theoretical frameworks. Studies based on Albert Bandura's work demonstrated that self-efficacy had a direct impact on individuals' interests, motivation, and career choices. According to social cognitive theory, students who believed they could succeed in STEM-related tasks were more likely to develop genuine interest and persevere despite challenges. Supporting this, global reports from UNESCO (2023) and the OECD (2022) showed that ICT integration enhanced both self-efficacy and interest, strengthening the relationship between the two and increasing students' likelihood of pursuing STEM careers.

Recent empirical studies also provided strong evidence of this relationship. For example, Lestari and S. (2023) found that self-efficacy had a major influence on students' learning interests, supporting the idea that confidence drove engagement. Similarly, Humairah, I. et al. (2024) showed that self-efficacy-based educational models effectively increased students' interests and abilities, particularly in structured learning environments. Riski (2024) also confirmed the interconnectedness of self-efficacy, interest, and motivation in influencing learning outcomes.

In addition, Fatonah and U. et al. (2024) used advanced measurement techniques to demonstrate that both self-efficacy and learning interest had a significant impact on students' academic performance, implying a reciprocal relationship between the two variables. Lusyiana, A. et al. (2025) also demonstrated that self-efficacy served as a mediator, linking educational experiences to students' interest in specific career paths. Overall, the literature consistently showed that students' interest and self-efficacy were highly interdependent. High levels of self-efficacy increased interest in STEM, which in turn reinforced confidence, resulting in a positive cycle that promoted academic engagement and career decision-making. Furthermore, the incorporation of ICT acted as a reinforcing factor, strengthening this relationship and encouraging more students to pursue STEM careers.

SHS Awareness of K-12 Curricular Exits

To investigate senior high school students' preferences for the four curricular exits in the K–12 program—higher education, middle-level skills development, entrepreneurship, and employment—Arimbay and Veloso (2023) carried out a descriptive survey. The study at Guruyan National High School during the 2022–2023 school year involved thirty Grade 12 students. The study aimed to determine which of the four options students wanted to pursue after graduation and how aware they were of these curricula. The researchers collected quantitative data to examine students' opinions and decision-making patterns using a descriptive survey method.

According to Arimbay and Veloso (2023), most pupils had a thorough understanding of the four curricular exits. 80% of those surveyed said they were aware

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of higher education, 16.7% said they were aware, and 3.3% said they were not. Of the pupils, 73.3% were aware of the development of middle-level skills, 13.3% were moderately aware, and 13.3% were not aware. 3.3% were unaware, 20% were knowledgeable, and 76.7% were aware of entrepreneurship. Likewise, 76.7% were aware, 16.7% were unaware, and 6.7% were unaware of employment. Additionally, the results revealed that while awareness of entrepreneurship and middle-level skill development was comparatively equivalent for both genders, female students showed slightly higher awareness levels of higher education and career options than male students. Most students stated that they intended to continue their studies after graduation; however, some chose to work or start their own business. Some students were still unsure of their preferred exit after senior high school, even though career counseling was part of the K–12 curriculum.

According to the findings, most senior high school students were aware of the many curriculum options, with higher education being the most popular choice, according to Arimbay and Veloso (2023). According to this research, most students want to pursue further education, but a smaller percentage want to work or start their own business after graduation. The researchers emphasized that socioeconomic circumstances, personal objectives, and the degree of career counseling students receive in school all influence their preferences. Additionally, they pointed out that the indecision of certain students emphasizes the necessity of stronger support networks that can assist them in making well-informed decisions regarding their education and careers.

The researchers suggested that schools hold pertinent and timely career orientations to allay these worries and better prepare pupils for life beyond senior high school. To effectively assist students in comprehending and assessing the four curriculum exits, they also recommended that educators receive specific training. Finally, they urged ongoing cooperation between the Department of Education's (DepEd) partners and stakeholders to improve the K–12 curriculum's implementation and guarantee that students have the necessary tools to successfully enter their chosen career routes.

Motivation and Theoretical Perspectives

Understanding ICT engagement in STEM education requires consideration of motivational theories that explain why students choose to participate and persist in learning activities. Expectancy-Value Theory (EVT) suggests that students' motivation is shaped by their expectations of success and the value they assign to tasks (Eccles & Wigfield, 2002). When ICT activities in STEM are structured to be goal-oriented, relevant, and achievable, students perceive their learning as useful and attainable, enhancing both competence beliefs and task value. Research indicated that gamified simulations, coding exercises, robotics projects, and other interactive ICT experiences provide mastery experiences and vicarious learning opportunities, which strengthen self-efficacy and intrinsic motivation (Baterna et al., 2020).

Bandura's Self-Efficacy Theory provided a complementary perspective by highlighting the role of belief in one's capabilities in determining effort, persistence, and resilience in learning (Bandura, 1997). According to Bandura, self-efficacy develops through four main sources: mastery experiences, vicarious experiences, verbal persuasion, and physiological states. In learner-centered ICT environments, Grade 10 students gained mastery experiences by completing simulations, coding exercises, and robotics projects; vicarious experiences by observing peers perform tasks; verbal persuasion through teacher feedback and encouragement; and positive emotional responses when engaging in interactive learning activities. These experiences collectively enhance students' confidence in their ability to tackle STEM-related challenges, increasing both their interest in STEM and their willingness to pursue the STEM strand in senior high school.

Private Schools get Flexible Curriculum

Because the K–12 curriculum was flexible, different junior high schools in the Philippines use Information and Communications Technology (ICT) in diverse ways, especially private schools. According to Republic Act No. 10533, "the curriculum shall be flexible enough to enable and allow schools to localize, indigenize, and enhance the same based on their respective educational and social contexts" (Republic of the Philippines, 2013, sec. 5[h]). This regulatory framework allows private schools to change how they teach subjects. For instance, they might not want to teach ICT as a separate subject. Instead, students commonly gain basic digital skills along with other technical skills in Technology and Livelihood Education (TLE) (Department of Education, 2019).

The Department of Education (DepEd) also allowed schools to decide which specializations to provide in TLE based on what they have, how many students they can handle, and what their main concentration is. This flexibility means that junior high school students don't always attend ICT-related classes like programming or computer servicing. These classes were usually more important in senior high school, especially in the Technical-Vocational-Livelihood track (Department of Education, 2016).

Various studies corroborate that the deployment of ICT in Philippine junior high schools was affected by the availability of resources and the preparedness of institutions. For example, Brasileño and Bidad (2021) observed that although ICT was used in junior high schools, it was not being used effectively because of problems including inadequate resources, old software, and slow internet connections. These limits could change depending on whether schools teach ICT or include it in other subjects. Ongco (2024) also said that schools lacking sufficient infrastructure, teacher training, and technical assistance may choose to forgo offering ICT on their own.

Additionally, teacher proficiency and ongoing professional development were essential for effective ICT implementation. Research indicates that the efficacy of TLE and ICT instruction was contingent upon teachers' digital literacy, training, and institutional support, which differ among schools (Excelise & Marapao, 2025). This indicates that certain private schools might refrain from providing ICT as an independent topic due to a deficiency of qualified educators or sufficient training programs.

Furthermore, comprehensive evaluations of ICT in Philippine education indicated that integration remains in a state of development and is inconsistent across various regions and institutions. Depending on the school's resources and the national support structures, ICT education was often rolled out slowly and in context (Tomaro, 2018). This makes the point that ICT was not taught as a separate subject in all junior high schools.

In general, the fact that some private junior high schools don't have ICT as a separate topic means they teach technology in other ways. Instead, it showed the flexible and integrative approach that national education policies promote, as well as the real-world problems that come with having few resources, infrastructure, and teachers who are ready to teach. These circumstances let schools integrate ICT skills into all their classes while still meeting their unique educational goals and needs.

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ICT Literacy of Junior High School Students

The level of Information and Communications Technology (ICT) literacy among junior high school students was examined across six domains, revealing a moderate overall level of competence (M = 3.33). Among these domains, access and evaluation of information obtained the highest mean score (M = 3.61), indicating that students demonstrated relatively strong abilities in locating digital information and assessing its credibility. In contrast, interaction through technologies (M = 3.44), effective application of technology (M = 3.38), media analysis (M = 3.26), creation of media products (M = 3.25), and utilization and management of information (M = 3.06) were all interpreted as moderate. These findings suggested that while students were capable of navigating and evaluating online information, they required further development in higher-order ICT competencies such as content creation, critical media analysis, and systematic information management. This multidimensional pattern aligned with contemporary digital competence frameworks, which emphasized that ICT literacy extended beyond technical skills to include critical thinking and creative production (Hero, 2022; Li et al., 2022).

The results indicated that students were generally proficient in accessing digital resources and evaluating online content, which were essential skills in information-rich learning environments. However, the moderate ratings in other domains highlighted the need for continued instructional support, particularly in developing students' ability to critically analyze digital media and create meaningful digital outputs. Prior research consistently emphasized the importance of fostering critical digital literacy to enable learners to navigate complex online information landscapes effectively (Li et al., 2022). Educational institutions therefore played a crucial role in enhancing these competencies through structured and sustained digital literacy programs that promoted responsible and informed technology use.

In addition to ICT literacy, the study also assessed students' ICT self-efficacy, defined as their confidence in using technology for learning purposes. The findings revealed that students moderately agreed with statements related to their ICT self-efficacy, with an overall mean of 3.45. Among the measured dimensions, privacy and security received the highest mean score (M = 3.61), suggesting that students were relatively confident in managing basic online safety practices, such as password protection and privacy settings. Communication (M = 3.48) and differentiation and learning (M = 3.25) were both rated as moderately agreed. While students appeared to possess awareness of digital safety, the lower score in differentiation and learning indicated that they still encountered difficulties in determining the reliability and academic quality of online information sources. This finding was consistent with previous studies showing that although students frequently used technology, they often struggled with evaluating the credibility of digital information (Li et al., 2022).

The relationship between ICT literacy and ICT self-efficacy was further analyzed using Pearson's product–moment correlation. The results revealed a moderate positive correlation between the two variables (r = .51), indicating that higher levels of ICT literacy were associated with greater confidence in using digital technologies. Moreover, the computed t-value (t = 6.84) exceeded the critical t-value (t = 1.96) at the .05 level of significance, leading to the rejection of the null hypothesis. This confirmed that ICT literacy had a statistically significant influence on ICT self-efficacy among junior high school students. These findings were supported by previous research demonstrating that ICT competence contributed significantly to students' confidence and motivation in using technology for academic purposes (Hatlevik et al., 2018; Senkbeil & Ihme, 2017; Rohatgi et al., 2016).

Overall, the results suggested that enhancing students' ICT literacy could positively impact their technological confidence. Students who were more knowledgeable and skilled in using digital tools were more likely to engage actively in technology-supported learning environments and achieve improved academic outcomes (Wang & Cheng, 2021). Consequently, strengthening both ICT literacy and ICT self-efficacy was essential for effective technology integration in education, as these competencies jointly supported students' ability to learn, adapt, and succeed in digitally mediated contexts.

Perceptions and Self-efficacy on ICT

The rapid advancement of computer connectivity had transformed the way people lived, worked, and studied worldwide. Information and Communication Technology (ICT) had become a vast network of tools that influenced nearly every aspect of daily life. The integration of ICT into educational settings brought significant changes in how schools operated and became an essential component of the teaching and learning process. Continuous exposure to ICT-related activities developed students' capabilities and shaped their perceptions of technology. Students who held more positive views of ICT were more likely to become skilled, confident, and self-sufficient in using digital tools. This shift also posed challenges for educators, as they needed to integrate ICT in ways that addressed the demands of 21st-century learners. Consequently, classrooms needed to be reconfigured into technology-enhanced environments that promoted inquiry, collaboration, and critical thinking in response to an increasingly digital society.

In this context, the study conducted by Bazer et al. (2022) entitled "Status of Students' Perceptions and Self-Efficacy on the Use of ICT" at Mindanao State University–Iligan Institute of Technology provided important insights into Filipino students' perceptions, attitudes, and confidence in ICT utilization. Using a descriptive-quantitative research design, the study demonstrated that students exhibited a high level of perception but only a moderate level of self-efficacy in using ICT. The findings showed that 78% of the respondents used ICT tools daily, including word processors, web browsers, and online learning platforms, while 22% reported limited usage due to lack of access to devices or digital resources. Furthermore, students from higher-income households exhibited greater self-efficacy compared to those from lower-income backgrounds, indicating that socioeconomic status influenced ICT confidence and proficiency. These findings were consistent with the goals of the Department of Education (2024) in the Basic Education Development Plan 2022–2030, which emphasized reducing digital inequality and ensuring equitable access to technology in schools.

The study further revealed that students generally demonstrated positive attitudes toward ICT. They expressed a strong desire to learn more about technology, preferred using it for research purposes, and enjoyed utilizing it to complete academic tasks and requirements. These findings suggested that students perceived ICT as a dynamic and evolving field that required continuous skill development. Their motivation to enhance ICT competencies reflected an awareness of the increasing importance of digital skills for academic and professional success. However, the study also found that students were less inclined to use ICT for reflective and collaborative purposes, such as creating digital portfolios or sharing their work online. This reluctance was partly attributed to fear of criticism from peers, highlighting the need to establish safe and supportive digital learning environments.

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In terms of ICT tool usage, the study identified word processors, web browsers, search engines, and email applications as the most used technologies among students. These tools primarily supported academic tasks such as research, writing, and information retrieval. In contrast, more complex applications, including desktop publishing software, video editing tools, and social bookmarking platforms, were less frequently used due to their complexity and limited curricular relevance. Supporting these findings, the Organisation for Economic Co-operation and Development (2005) reported that a significant proportion of students across member countries frequently used the Internet and word-processing applications because of their effectiveness in supporting learning. This trend suggested that frequent exposure to commonly used ICT tools contributed to higher levels of skill development. Consistent with this, Bazer et al. (2022) found that students rated their proficiency in frequently used applications as “excellent” or “very good,” indicating a strong relationship between ICT exposure and self-efficacy.

Overall, the literature suggested that ICT integration played a crucial role in shaping students’ perceptions, attitudes, and confidence in using technology. While students generally demonstrated positive attitudes and frequent ICT usage, disparities in access and varying levels of self-efficacy remained key concerns. These findings underscored the importance of promoting equitable access to technology, fostering supportive digital environments, and encouraging broader use of ICT tools to enhance students’ competence and confidence in the digital age.

Enhancing STEM Students’ Academic Engagement and Interest

The integration of Information and Communication Technology (ICT) in education significantly transformed how students learned, particularly in Science, Technology, Engineering, and Mathematics (STEM) disciplines. Alongside technological integration, students’ self-efficacy and level of interest were identified as critical factors influencing academic performance. Self-efficacy, rooted in Albert Bandura’s Social Cognitive Theory, referred to an individual’s belief in their capability to successfully perform specific tasks. This belief system played a vital role in shaping students’ motivation, persistence, and level of engagement in learning activities (Cherry, 2020).

According to Bandura’s framework, self-efficacy was developed through four primary sources: mastery experiences, vicarious experiences, verbal persuasion, and physiological feedback (Lopez-Garrido, 2020). Mastery experiences, which involved repeated success or failure in performing tasks, were considered the most influential. Consistent success strengthened confidence, while repeated failure weakened self-belief. Vicarious experiences occurred when students observed others succeed, fostering the perception that they too could achieve similar outcomes. Verbal persuasion involved encouragement and feedback from teachers and peers, while physiological feedback pertained to emotional and physical responses such as anxiety, stress, or fatigue during task performance (Bangga, 2021). Research indicated that students with higher levels of self-efficacy tended to engage more deeply in academic tasks, demonstrated greater perseverance, and viewed challenges as opportunities for growth rather than obstacles (Cherry, 2021).

Recent studies reinforced the importance of these sources in shaping STEM students’ academic engagement and performance. In a study conducted by Tiangco et al. (2024), mastery experiences emerged as the strongest contributor to self-efficacy. Students who consistently succeeded in completing academic tasks, overcame challenges, and accumulated positive learning experiences reported higher confidence in their abilities. This increased confidence translated into stronger engagement and persistence in STEM-related activities. These findings highlighted the importance of designing learning environments that provided students with achievable challenges and opportunities for success.

Similarly, vicarious experiences were found to have a significant positive impact on self-efficacy. Observing peers successfully complete tasks and apply effective strategies motivated students and enhanced their belief in their own capabilities. This underscored the value of peer modeling and collaborative learning environments in STEM education, where students could learn from one another and build confidence through shared experiences (Tiangco et al., 2024).

Physiological feedback, while present in the form of nervousness, fatigue, or emotional responses to challenging tasks, appeared to have minimal influence on students' overall self-efficacy. Although students reported experiencing tiredness or mild anxiety, these factors did not significantly diminish their confidence in their abilities. This suggested that students were capable of maintaining self-belief despite temporary discomfort, particularly when supported by positive learning experiences (Tiangco et al., 2024).

Verbal persuasion also played an important role in reinforcing self-efficacy. Positive feedback, encouragement, and recognition of achievements—especially from peers—significantly boosted students' motivation and confidence. Although teacher praise was reported less frequently, both teacher and peer encouragement contributed to strengthening students' belief in their capabilities. This finding emphasized the importance of supportive classroom environments where constructive feedback was consistently provided (Tiangco et al., 2024).

In terms of demographic variables, the study revealed a significant difference in self-efficacy based on sex, while no significant differences were observed when students were grouped according to specialization or general weighted average (GWA). Furthermore, correlation analysis indicated a moderate positive relationship ($r = 0.4422$) between self-efficacy and academic performance. This suggested that students with higher self-efficacy tended to achieve better academic outcomes in STEM subjects, reinforcing the idea that confidence in one's abilities was closely linked to performance.

The findings also highlighted the role of ICT in supporting the development of self-efficacy and interest in STEM education. ICT integration provided students with interactive and engaging learning opportunities, such as simulations, multimedia tools, and collaborative platforms. These tools enabled students to experience mastery, observe peer success, and receive feedback, all of which contributed to strengthening self-efficacy (De Guzman, 2021). By creating dynamic and student-centered learning environments, ICT fostered both confidence and interest in tackling complex STEM concepts.

Overall, the literature suggested that self-efficacy was a key determinant of students' engagement and success in STEM learning. Emphasizing mastery experiences, promoting observational learning, providing consistent verbal encouragement, and designing tasks that balanced challenge and support were essential strategies for enhancing both academic performance and student interest (Tus, 2020). The integration of ICT further amplified these effects by offering meaningful and motivating learning experiences, ultimately contributing to improved educational outcomes and the development of lifelong learning skills.

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Self-Efficacy Theory Towards STEM Strands

Dale H. Schunk defined self-efficacy as individuals' convictions about their capacity to acquire knowledge or execute activities (Schunk, 1996). It was divided into two related parts: self-efficacy for learning, which is the belief that you can learn new things or skills, and self-efficacy for performance, which is the belief that you can do a learned task to a certain level (Schunk, 1995). These beliefs affected motivation, the choice of tasks, effort, persistence, and the results of performance. Schunk's foundational research emphasized that students who possess self-efficacy regarding their learning and performance are more inclined to engage proactively, establish elevated objectives, track their advancement, and demonstrate perseverance in the face of obstacles (Schunk, 1985, 1989, 1990).

Recent empirical investigations had broadened Schunk’s theoretical framework to encompass STEM and technology-enhanced educational environments. According to Awaludin, Ruhiyat, and Anriani (2023), they investigated 100 students in a STEM program and found that a STEM learning model significantly impacted students' self-efficacy, thereby improving learning outcomes. This research corroborated Schunk's claim that mastery experiences enhance efficacy beliefs, which reinforces the importance of instructional practices that facilitate student success. In a longitudinal study in China, researchers created a reliable tool to assess science self-efficacy in high school students, monitoring variations from Grade 10 to Grade 11. The research elucidated trends in self-efficacy development and gender disparities, indicating that self-efficacy is adaptable and sensitive to curricular interventions (Stemeducationjournal, 2022).

In the Philippine setting, Baylon (2024) investigated digital literacy and self-efficacy among Grade 12 STEM students, revealing exceptionally high levels of both variables. The study also showed a moderate, significant link between students' digital literacy and self-efficacy. This means that being proficient with technology can make kids more confident in mastering STEM courses. In Indonesia, Yanuarto, Anggoro, and Setyaningsih (2023) examined the moderating effect of self-efficacy on the link between ICT literacy and students’ self-concept in inquiry-based learning. They discovered that students possessing elevated self-efficacy demonstrated more pronounced beneficial impacts of ICT literacy on self-concept, indicating the importance of self-efficacy in optimizing the advantages of technology integration.

Other research had illustrated the importance of self-efficacy in online and hybrid learning contexts. Bangga (2023) found that senior high school STEM students with higher self-efficacy were more likely to participate in online physics classes. This supports the premise that self-efficacy predicts not only learning results but also active participation in environments that use technology. Kwon et al. (2021) discovered that teacher self-efficacy had a substantial impact on students' STEM knowledge attainment and career awareness, indicating that efficacy beliefs within the educational context influence student learning and ambitions. Whitcomb et al. (2020) also found that female engineering students' self-efficacy did not match their performance, which indicates that there may be differences in how competent they think they are and how competent they are.

Together, these studies support and build on Schunk's ideas, showing that self-efficacy is a favourable predictor of learning and performance and can be changed by how teachers teach, how technology was used, and other supports in the environment. In the context of this study—examining students’ desire and self-efficacy in pursuing the STEM strand and their awareness of ICT courses—these findings indicate that the implementation of ICT and instrumentation courses may function as mastery

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experiences that bolster self-efficacy. Furthermore, technology literacy, gender, and pedagogical approaches may influence the evolution of students' efficacy beliefs. Thereby, it was important to use proven tools to precisely measure self-efficacy to see how it affects students' learning and performance in STEM-related fields.

Expectancy-Value Theory Towards STEM Strands

Expectancy-Value Theory (EVT) asserts that students' academic engagement, decisions, and perseverance are influenced by their expectations of success (i.e., beliefs regarding their capability to succeed) and the subjective value they ascribe to a task (including intrinsic interest, achievement, utility, and cost) (Eccles & Wigfield, 2020). Wigfield, Tonks, and Eccles (2017) underscored that sociocultural context, educational expectations, and societal values shape the formation of students' expectancy and value beliefs from a cross-cultural standpoint. In the realm of ICT and STEM education, initial exposure to technology or instruments can provide mastery experiences, elevating students' expectations and illustrating the utility and significance of STEM learning, thereby increasing task value.

Studies conducted in the Philippines offer empirical validation for the implementation of EVT in STEM education. Bello (2024) conducted a study involving 1,176 college freshmen enrolled in STEM courses, revealing that over 90% of participants exhibited minimal physics achievement, irrespective of their prior STEM knowledge. Nonetheless, students exhibited elevated levels of expectation and value beliefs (enjoyment and perceived utility of STEM assignments), which buffered the influence of 21st-century skills on physics performance. This suggests that motivated attitudes may persist robustly despite suboptimal academic achievement, underscoring the predictive significance of anticipation and value in educational outcomes.

Similarly, Sebial and Mirasol (2023) investigated 664 senior high school STEM students from 17 STEM high schools in the Philippines with structural equation modelling. The study demonstrated that expectation and task value were important predictors of mathematics performance, thus affirming the applicability of Expectation-Value Theory (EVT) in forecasting STEM-related academic accomplishment in the Philippine context. This means that students who think they are good at STEM tasks and see their value are more likely to succeed and stay in these classes.

Moreover, Valles (2024) examined 150 junior high school students in Davao Oriental and discovered that their passion for studying and expectancy-value views regarding STEM were significantly high, revealing a strong positive association between motivation and expectancy-value beliefs. This research emphasized that the early development of motivational and expectancy-value factors is associated with students' involvement and interest in STEM disciplines. Philippine teens' EVT-related beliefs predicted their STEM performance and motivation, according to these studies. They also showed that early exposure to ICT or STEM could help shape these beliefs, making them more ready for senior high school STEM paths.

This study examined Grade 10 students' interest and self-efficacy in pursuing the STEM track in accordance with their exposure to ICT subjects, suggesting that early exposure may augment anticipation (confidence) and value (perceived relevance), subsequently impacting STEM strand selections. EVT offered a comprehensive theoretical framework for understanding the impact of early experiences on motivation, self-efficacy, and eventual educational success.

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Differences and Relationship between Interest and Self-efficacy

According to Budiarti et al. (2022), there were significant differences and relationships between the attitudes and self-efficacy of male and female junior high school students in science classrooms. In the context of 21st-century education, learning extended beyond knowledge acquisition to include the development of attitudes, skills, and technological competence. Science education played a crucial role in fostering critical thinking, creativity, and scientific understanding among students. Two important psychological constructs that influenced science learning were students' attitudes toward the subject and their self-efficacy. Attitude referred to students' emotional readiness and feelings about science, whereas self-efficacy referred to their belief in their ability to accomplish learning tasks and overcome academic challenges. Although previous studies had examined these variables separately, fewer studies had explored them simultaneously while considering gender differences, which became the focus of this investigation.

The study utilized a quantitative survey design with comparative analysis. The participants consisted of 74 students from SMP 10 Mestong in Muaro Jambi Regency, Indonesia, including 40 female and 34 male students from two classes. Data were collected through a 28-item questionnaire using a five-point Likert scale. The instrument measured two main variables: attitude and self-efficacy. Attitude was assessed through indicators such as the adoption of scientific attitudes and enjoyment in learning science, while self-efficacy included individual expectations of ability and the perception of challenges as non-obstacles. The data were analyzed using both descriptive and inferential statistical methods, including normality and linearity tests, independent samples t-tests, and Pearson product–moment correlation analysis.

The descriptive findings indicated that male students generally demonstrated more positive attitudes toward science compared to female students. In terms of adopting scientific attitudes, a large proportion of students from both genders fell within the "good" category; however, male students showed a higher representation in this group. Similarly, regarding enjoyment in learning science, male students exhibited stronger positive responses, although many students from both groups were still categorized at a "sufficient" level. These patterns suggested that while both male and female students held moderately positive views toward science, male students tended to express more favourable attitudes overall.

In relation to self-efficacy, the findings showed that male students generally exhibited higher levels of confidence in their ability to perform science-related tasks than female students. Most students from both groups were categorized within the "good" or "sufficient" levels of self-efficacy. Male students were more likely to perceive themselves as capable of completing academic tasks and overcoming challenges, whereas female students showed slightly lower confidence levels. These results suggested that gender differences played a role in shaping students' self-beliefs in science learning contexts.

The inferential statistical analysis further supported these observations. The normality test results indicated that the data were normally distributed, as all significance values exceeded .05. The linearity test confirmed that the relationship between attitudes and self-efficacy was linear. Furthermore, the independent samples t-test revealed statistically significant differences between male and female students in both attitudes and self-efficacy, as all significance values were below .05. This indicated that gender had a significant effect on both variables.

The correlation analysis revealed a moderate positive relationship between attitudes and self-efficacy for both male and female students. This finding indicated that students who exhibited more positive attitudes toward science also tended to demonstrate higher levels of self-efficacy. In other words, enjoyment of science and the adoption of positive scientific attitudes were associated with stronger confidence in one's ability to succeed in science-related tasks.

Overall, the findings demonstrated that gender differences influenced both attitudes and self-efficacy among junior high school students in science education, with male students generally showing slightly higher levels in both areas. Additionally, the study established a significant and positive relationship between attitudes and self-efficacy, suggesting that these variables were closely interconnected. Students who developed positive perceptions of science were more likely to build confidence in their academic abilities. However, the study acknowledged certain limitations, including its focus on a single school and the examination of only two variables. It was therefore recommended that future research include larger and more diverse samples, as well as additional variables such as motivation, learning strategies, and instructional approaches, to gain a more comprehensive understanding of the factors influencing students' attitudes and self-efficacy in science learning.

Competitive Enrolment Policies and Self-Efficacy

Nguyen and Lewis (2020) executed a pivotal study examining the impact of competitive enrolment practices in computing departments on first-year students' sense of belonging, self-efficacy, and perceptions of their academic environment. Drawing on survey data from 1,245 first-year students across 80 computing departments, their findings revealed that departments with competitive enrolment systems—such as grade thresholds or limited-capacity admission—tend to have students reporting lower levels of belonging, self-efficacy, and perceived departmental support. The average belonging score for students in competitive programs was 3.89 (SD = 0.87), which is far lower than the average for students in non-competitive programs. The findings indicated that measures aimed at restricting access to computing majors may unintentionally foster sentiments of exclusion, especially among students who are newcomers to the discipline.

According to Nguyen and Lewis (2020), the sense of belonging is how accepted, included, and recognized students feel in their academic environment. Students who saw diminished integration or assistance were more inclined to doubt their suitability within the computing discipline. The researchers discovered that competitive enrollment procedures were a substantial negative predictor of belonging, especially among students lacking prior computing skills. The researchers also observed a negative impact on students' self-efficacy, which refers to their confidence in their ability to perform computing tasks effectively. The overall average self-efficacy score among participants was quite high (M = 4.51, SD = 0.65). However, competitive policies were associated with lower self-efficacy ratings, suggesting that restrictive systems can diminish students' confidence in their academic ability. These findings correspond with Bandura's (1997) theory of self-efficacy, which asserts that individuals' convictions in their capacity to succeed are crucial for motivation, resilience, and academic accomplishment.

Nguyen and Lewis (2020) also looked at how students felt about their department as a friendly place to be, in addition to belonging and self-efficacy. Regression studies indicated a substantial negative correlation ($\beta = -0.27$) between competitive enrolment rules and perceptions of inclusion. This conclusion was

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especially evident among students with prior computing knowledge, suggesting that even experienced learners view competitive academic environments as unwelcoming. The research by Nguyen and Lewis provides significant empirical evidence that institutional policies can influence students' psychological and social experiences in computing education.

Nguyen and Lewis (2020) also talked about the limits of their study, such as the conservative way they grouped competitive departments and the fact that the study was cross-sectional, which made it difficult to draw causal conclusions. Nevertheless, their multi-institutional dataset boosts generalizability and offers vital knowledge about the junction of policy and student experience. From an equity perspective, the findings emphasized the systemic challenges faced by underrepresented groups in computing. Competitive admission structures might worsen disparities by discouraging participation from students with limited prior exposure or those from marginalized backgrounds. This aligned with substantial educational literature that highlights the importance of inclusive and supportive learning environments in fostering a sense of belonging and self-efficacy among STEM students (Eccles & Wigfield, 2020).

According to Nguyen and Lewis's (2020), highlighted the significant psychological and structural consequences of competitive enrolment strategies in computing education. Their findings suggested that equitable and open-access departmental policies can promote greater inclusion, motivation, and persistence among students. Their study made an essential contribution to ongoing conversations regarding student retention, motivation, and academic achievement in STEM fields by relating institutional policies to psychological concepts like belonging and self-efficacy.

Teacher Preparedness for SHS Implementation

Migallos, Ballada, and Balila (2020) did a study to evaluate the preparedness of K–12 senior high school teachers at a specific private institution in the Philippines during the implementation of the Senior High School (SHS) curriculum. The study sought to investigate teachers' perspectives regarding their preparedness, eligibility, methods of preparation, and the assistance offered by their school.

The results showed that most instructors felt satisfied about how ready they were for the K–12 SHS curriculum. They said they were proficient at many important aspects of teaching, such as using different ways to test students, judging how well they did, leading class discussions, adapting lessons to different learning styles, and making lessons that fit with SHS standards across subjects. Still, about half of the instructors thought they were only somewhat ready because many of them had not yet completed the Licensure Examination for instructors (LET). The study observed that this issue did not substantially influence their confidence or perceived teaching competency, considering the five-year grace period provided by the Department of Education for unlicensed teachers in senior high school jobs.

In terms of institutional support, faculty development and retooling were considered the most significant methods of assisting readiness. Specifically, 94.4% of respondents said strengthening teachers' skills was the most essential staffing rule. The school showed its support by changing the curriculum, offering professional development programs, and educating its staff. All these things helped teachers adjust to the changes that came with the K–12 reform.

The study also showed how teachers and administrators dealt with problems that came up during implementation by using different coping mechanisms. These included getting to know the International Baccalaureate Diploma Program (IBDP), which is used as a guide for designing the curriculum; working together and speaking

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with other teachers to map out the curriculum; being open to change; and being committed to professional growth.

In general, Migallos et al. (2020) found that teachers had positive attitudes and were competent but were not fully prepared, indicating that capacity-building programs are still needed. The study underscores that the effectiveness of the K–12 program is primarily dependent on teacher quality, institutional support, and ongoing professional development to improve readiness and enhance the quality of education at the senior high school level.

Learner Expectations and Socio-Economic Context

The socioeconomic background significantly influenced students' engagement with Information and Communication Technology (ICT) and their interest in Science, Technology, Engineering, and Mathematics (STEM) education. Students from low-income households sometimes face financial constraints that necessitate prioritizing immediate economic demands—such as augmenting family income or pursuing early employment—over long-term educational strategies (Baterna et al., 2020). These pressures might affect learners' choices to engage in abbreviated educational trajectories, such as Technical-Vocational-Livelihood (TVL) strands, and may restrict their ongoing involvement in initiatives like the MATATAG Curriculum (Department of Education, 2024).

Access to ICT was inequitable, with numerous children from economically poor backgrounds facing restricted exposure to digital tools and technology beyond the educational environment (Baterna et al., 2020). Financial limitations, limited access to technology, and variations in parental support synergistically impact kids' ICT self-efficacy and preparedness to engage in advanced STEM paths (Baylon, 2024; Baterna et al., 2020). In the absence of adequate access to digital resources, children from economically disadvantaged households were at risk of falling behind their wealthier counterparts, so perpetuating cycles of educational inequality.

National statistics revealed persistent discrepancies in digital connectivity. In 2024, just 48.8% of Filipino houses reported internet connectivity, indicating that a large majority of pupils are still disconnected and underserved by digital resources (Philippine Statistics Authority, 2025). In this setting, regional disparities persist, with urban areas such as Metro Manila having higher connectivity rates than less urbanized areas, emphasizing the socioeconomic digital divide that continues to affect educational opportunities.

Many public educational institutions continued to encounter obstacles due to insufficient ICT infrastructure, impeding students' acquisition of vital digital literacy skills necessary for substantive engagement in STEM education (Philippine Institute for Development Studies, 2023). These issues were exacerbated in rural and resource-limited regions, where inadequate infrastructure further hinders fair ICT integration and participation in technology-enhanced learning environments.

Socioeconomic disparities also affected kids' academic objectives and ambitions. Students from low-income families may have increased anxiety over the pursuit of demanding academic pathways, such as STEM disciplines, partly due to fears of academic failure and extended educational commitment (Baterna et al., 2020). Furthermore, parents with restricted ICT or STEM expertise might be less equipped to assist their children's academic growth in these domains, so further impacting kids' confidence and motivation (Baylon, 2024). Decreased self-efficacy could adversely affect students' perseverance, academic performance, and overall achievement in STEM fields.

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Empirical research indicated that strategic and early exposure to ICT can alleviate the adverse impacts of socioeconomic disadvantage on STEM readiness. Regions with enhanced home internet connectivity exhibited greater potential for student engagement with digital learning tools; yet substantial disparities persist (Philippine Statistics Authority, 2025). Institutions that adopt ICT-enriched curricula offered learners the chance to participate in genuine digital experiences, such as simulations, collaborative technologies, and project-based assignments, hence improving students' digital skills and STEM preparedness (Baterna et al., 2020).

Implications for STEM Interest and Self-Efficacy

Integrating ICT into learner-centered education increased Grade 10 students' enthusiasm and self-efficacy in STEM. This approach, based on Bandura's Self-Efficacy Theory (SET) and Expectancy-Value Theory (EVT), focused on students' beliefs in their skills as well as the perceived value of learning activities (Bandura, 1997; Eccles & Wigfield, 2002). Simulations, robotics, programming, and other interactive ICT tools actively engage students in problem-solving and critical thinking, which boosts self-efficacy and develops long-term interest in STEM courses (Lee, 2020).

ICT-rich instruction also improved students' perceptions of STEM relevance. Connecting concepts to real-world applications helps learners appreciate the importance of STEM abilities for higher education and future employment, reinforcing the task value and success expectations indicated in EVT. As students gain mastery of ICT-based activities, watch peers performing assignments, and receive feedback from teachers, their self-efficacy in dealing with STEM-related issues grows, inspiring them to pursue STEM strands in senior high school (Bandura, 1997).

Students from a wide range of socioeconomic situations could now benefit from hands-on, learner-centered STEM experiences because to equitable access to ICT. Providing opportunities for authentic digital learning and collaborative projects promotes competence and self-efficacy while removing barriers caused by restricted resources. This method not only improved academic skills, but also fosters long-term enthusiasm and confidence in STEM, preparing Grade 10 students for future education, professions, and lifelong involvement in science and technology (Baterna et al., 2020; Baylon, 2024).

By applying Social Cognitive Theory (SCT) and Expectancy-Value Theory (EVT), ICT-based learner-centered instruction simultaneously enhanced technical competencies, interest, and self-efficacy, guiding Grade 10 students to make informed decisions about pursuing STEM pathways and building the confidence to succeed in these fields (Baterna et al., 2020; STEMpedia, 2024).

Research Questions

The rapid advancement of technology has transformed education, with an emphasis on ICT integration. In the Philippines, ICT was recognized as a key strategy to enhance STEM motivation and competence, yet adoption is limited, and its impact on students' academic interests is unclear. This study examined whether exposure to ICT in high school influences students' choice of the STEM track, which many avoid due to perceived difficulty or low motivation. Guided by Expectancy-Value Theory (Eccles & Wigfield, 2002) and Self-Efficacy Theory (Bandura, 1977), it investigated how prior ICT knowledge affects students' interest and self-efficacy to pursue STEM tracks. Data were collected through a 5-point Likert scale questionnaire comparing

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Grade 10 students' level of interest and self-efficacy in pursuing the Senior High School (SHS) STEM track with and without ICT experiences.

The research aimed to answer the following specific questions:

1. What is the profile of the students with respect to:
   1.1 Sex
   1.2 With ICT subjects and without the ICT subjects
2. What is the level of interest of Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects?
3. What is the level of self-efficacy of Grade 10 respondents in pursuing the SHS STEM track with and without the ICT subjects?
4. Is there a significant difference in the level of interest and self-efficacy of the Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects when grouped according to sex?
5. Is there a significant difference in the level of interest of Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects?
6. Is there a significant difference in the level of self-efficacy of Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects?
7. Is there a significant relationship between the level of interest and self-efficacy of the Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects?
8. What program can be proposed based on the findings of the study?

Hypothesis

To answer the specific problems, the following hypotheses were stated:

1. **For Research Question 4:** There is no significant difference in the level of interest and self-efficacy of the Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects when grouped according to sex.

2. **For Research Question 5:** There is no significant difference in the level of interest in pursuing the SHS STEM track among Grade 10 students with ICT subjects compared to those without ICT subjects.

3. **For Research Question 6:** There is no significant difference in the level of self-efficacy in pursuing the SHS STEM track among Grade 10 students with ICT subjects compared to those without ICT subjects.
4. **For Research Question 7:** There is no significant relationship between the level of interest and self-efficacy of the Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects.

Scope of the Study

This study aims to examine the significant difference and relationship in the level of interest and level of self-efficacy in pursuing the Science, Technology, Engineering, and Mathematics (STEM) strand among Grade 10 students enrolled in selected private junior high schools in Calamba City, Laguna, Philippines, during School Year 2025–2026. The participating schools are differentiated based on whether ICT subjects are included in the junior high school curriculum (grades 7 to 10). One school incorporates ICT-related courses, while the other does not formally offer ICT subjects. The study focuses on the role of junior high school ICT subjects in the curriculum rather than individual prior ICT experience or exposure.

A purposive sampling method was employed to select the participants of the study. The students consisted of 100 Grade 10 students, with 50 students selected from one section in each participating school. The selected sections were chosen to ensure comparable sample sizes for analysis. These students were selected because they are currently preparing to select their senior high school academic track, making them appropriate participants for examining their interest and self-efficacy toward the STEM track.

The study utilized both the comparative and correlational research designs to determine whether differences in the inclusion of ICT subjects in the school curriculum were associated with variations in students' interest in STEM and self-efficacy in pursuing STEM-related studies and the relationship between interest and self-efficacy in pursuing the STEM strand in the senior high school. Data were collected using a 5-point Likert scale questionnaire designed to measure students' level of interest in STEM and confidence in performing STEM-related academic tasks. In this research, the presence or absence of ICT subjects in the grade 10 school curriculum serves as the independent variable, while students' level of interest and self-efficacy in pursuing the STEM strand serve as the dependent variables.

The survey was carried out between February 23 and February 25, 2026, near the end of the school year, when students had finished most of their Grade 10 coursework and were starting to choose their senior high school academic track. A parent consent letter was provided via the parent-teacher group chat, and a letter of approval was sent to the principal/administrator. The questionnaire was also attached to the teacher's post in the group chat. It was stressed that this is voluntary and that it is being used for research. The parents agreed to move forward with the survey after the teacher promised to administer the questionnaire.

To ensure confidentiality and comply with the Data Privacy Act of 2012 and the guidelines of the National Privacy Commission, the identities of the participating schools and respondents were kept anonymous. The schools were referred to using pseudonyms (School A and School B). The questionnaire did not require students to provide their names or any personally identifiable information. Students were only asked to indicate their gender anonymously for demographic purposes, without linking it to their individual responses.

Before completing the optional survey, students were informed of the goal of the study and that their responses would be kept confidential. The survey was administered by the class instructors designated by the principals or school officials, who were also in charge of distributing and gathering the printed questionnaires inside the classroom to further preserve discretion. The proctor was instructed by the researcher to help the pupils complete the questionnaire in advance. This procedure ensured that the researcher did not record any personally identifying student information.

Delimitation of the Study

This study was limited to examining students' self-reported interest in STEM and self-efficacy in pursuing the STEM strand, as measured through a 5-point Likert scale questionnaire. The research does not evaluate students' actual academic performance, grades, or technical competencies in ICT or STEM-related subjects.

The students were limited to Grade 10 students from one selected section in each participating private secondary school in Calamba City, with a total of 100

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participants. Therefore, the findings may not be generalizable to all secondary school students in other schools, grade levels, or regions.

Additionally, the study focuses solely on the difference and relationship between the presence of ICT subjects in the curriculum and students' interest and self-efficacy in pursuing the STEM strand in senior high school (SHS). Other factors that may influence students' decision to pursue the STEM strand—such as socioeconomic background, parental influence, peer influence, career aspirations, or school resources beyond ICT instruction—were not included in the analysis.

Furthermore, because the questionnaires were administered through teachers to maintain anonymity and comply with privacy policies, the researcher had no direct interaction with the respondents during the survey process, which may limit opportunities for clarification of survey questions. Despite these limitations, the study aims to offer suggestions about how curricular inclusion of ICT subjects may influence students' motivation and confidence in pursuing STEM education.

Theoretical Framework

This research was based on Albert Bandura's Self-Efficacy Theory (1997) and Jacquelynne S. Eccles and Allan Wigfield's Expectancy-Value Theory (2002). These theories offered a framework for comprehending how students' perceptions of their capabilities and the significance they attribute to learning tasks affect their academic interests, motivation, and educational decisions, especially regarding the pursuit of the Science, Technology, Engineering, and Mathematics (STEM) pathway.

Self-Efficacy Theory suggested that individuals' views regarding their capacity to execute tasks profoundly affect their motivation, effort, perseverance, and performance. In this study, self-efficacy pertained to the confidence of Grade 10 students in executing STEM-related tasks, including solving scientific problems, utilizing technology tools, and engaging in analytical thinking. The hypothesis suggested that students exhibiting elevated self-efficacy were more inclined to tackle demanding learning problems with enhanced effort and perseverance, hence augmenting their propensity to pursue academic trajectories associated with STEM.

Bandura elaborated that self-efficacy was cultivated through four principal sources: mastery experiences, vicarious experiences, social persuasion, and physiological conditions. Learning about Information and Communication Technology (ICT) could give students chances to exercise their tech abilities, see their classmates do ICT activities well, and get feedback from their teachers. These educational experiences might enhance students' confidence in their capacity to execute activities associated with STEM fields.

The Expectancy-Value Theory created by Eccles and Wigfield adds to this view by showing how two main things affect students' academic choices: their expectations for success and the value they place on the work. Expectancy for success pertained to students' perceptions on their anticipated performance on a work, whereas subjective task value relates to the significance, utility, or intrigue they associate with the activity. In the context of this study, students who regard STEM-related tasks as meaningful and believe in their ability to achieve were more inclined to cultivate a heightened interest in pursuing the STEM pathway.

The integration of ICT in education might influence both anticipation and task value. Students studying ICT may find STEM courses more pertinent and advantageous in today's technology-driven environment. This exposure may enhance their perception of the value and importance of STEM fields, hence increasing their motivation to follow STEM-related academic paths.

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In this study, interest in STEM denoted the students' eagerness and readiness to participate in STEM-related learning and to pursue the STEM strand in Senior High School, whereas self-efficacy indicates their confidence in their capacity to successfully execute STEM-related academic activities. These conceptions were analysed concerning students' exposure to ICT subjects (with or without ICT) and their sex, seen as a categorical variable that may affect variations in interest and self-efficacy.

This study, grounded in Self-Efficacy Theory and Expectancy-Value Theory, suggested that exposure to ICT subjects may influence students' motivational beliefs by enhancing their confidence in doing technology-related activities and increasing the perceived value of STEM education. Consequently, students exposed to ICT subjects may demonstrate increased passion and self-efficacy in pursuing the STEM pathway compared to those without such exposure. The framework recognized possible differences based on sex and suggests a positive relationship between interest and self-efficacy, indicating that pupils with confidence in their abilities were more likely to develop a greater interest in STEM track.

Thus, the integration of Self-Efficacy Theory (SET) and Expectancy-Value Theory (EVT) provided a theoretical basis for examining how ICT exposure influences Grade 10 students’ interest and self-efficacy in pursuing the STEM tracks in Senior High School. self-efficacy.

The use of Information and Communication Technology (ICT) in learner-centered STEM education had demonstrated a substantial impact on both interest and self-efficacy among Grade 10 students. Based on Bandura's Self-Efficacy Theory (1997), students' confidence in their ability to do STEM tasks was boosted by experiences that help them master tasks, learn by watching others, get feedback, and actively use interactive tools like simulations, coding exercises, robotics, and data-driven projects. These experiences enabled students to perceive themselves as capable of comprehending challenging STEM concepts, hence increasing their willingness to confront problems and persist in their STEM studies.

Furthermore, Expectancy-Value Theory (Eccles & Wigfield, 2002) posits that students' motivation was contingent upon their anticipated performance and the significance they attributed to tasks. When ICT-integrated learning was designed to be relevant, accessible, and connected to practical applications, students regard STEM track as meaningful and attainable. The correlation between the value of a work and a student's confidence in it fostered intrinsic motivation, hence sustaining student interest and engagement in STEM pathways throughout time.

SET and EVT together gave us a theoretical basis for understanding how exposure to ICT subjects can affect academic decision-making, such as the choice to follow the STEM strand in senior high school. Students who had high level of self-efficacy were more likely to believe they can do well in STEM. On the other hand, a strong sense of expectancy-value confirmed how important and relevant STEM tasks. Combining these things not only made students more interested in STEM but also gave them the confidence to follow the path and do well in it.

Consequently, the conceptual framework of the study assumed that exposure to ICT subjects may influence students’ level of interest and self-efficacy in pursuing STEM track. Students who are exposed to ICT subjects might develop stronger technological skills and confidence, which may enhance their interest in STEM-related learning.

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METHODOLOGY

Research Design

This study utilized both comparative and correlational descriptive quantitative research design. Comparative quantitative design was employed to determine the differences in the levels of interest and self-efficacy among Grade 10 students who are enrolled in ICT subjects and those who are not. The study centered on a comparison of students from two private high schools in Calamba City: School A which does not include ICT subjects in their junior high school and School B which incorporates ICT subjects into its junior high school curriculum. Correlational design examines the relationship between two or more variables without manipulating them to determine whether variables are related or associated. In this study the relationship between the level of interest and the level of self-efficacy among Grade 10 students in pursuing the STEM strand was also determined. These methodologies, both the correlational and comparative were deemed appropriate as it enabled the systematic collection and analysis of quantitative data, hence facilitating the discovery of group disparities while simultaneously assessing correlations across variables (Creswell & Creswell, 2018). The comparative component facilitated the identification of differences in students' interest and self-efficacy as influenced by ICT exposure, while the correlational component investigated the relationship between ICT integration and students' desire and confidence in pursuing STEM education. Quantitative research provided objective and quantifiable insights into cognitive and affective qualities, such as curiosity, motivation, and self-efficacy, making it particularly suitable for the analysis of educational outcomes and technological engagement (Baterna, Lioenko, & Huzar, 2020).

The students were selected by purposive sampling to ensure that representation of students with and without ICT subjects in their junior high school. Both private schools offered STEM track in their senior high school which strengthen the purposive sampling of the study.

A researcher prepared a questionnaire to find out how interested students were in the STEM strand, how confident they were in STEM-related tasks, and how much they had used ICT. The questionnaire employed a five-point Likert scale, with one being "Strongly Disagree" and five being "Strongly Agree." It contained two main elements. The first half asked students how excited, motivated, and ready they were to enrol in STEM classes. The second portion measured how confident the students were and how much they knew about basic programming, robotics, and digital simulations to see how self-efficacious and aware of ICT they were. This section of the tool was based on Bandura's (1997) Self-Efficacy Theory, which claims that you need to feel you can plan and do things to accomplish performance goals. To make sure the questionnaire was authentic and reliable, selected professionals were asked to validate and examine it before addressing the questionnaire to group of respondents.

The researcher utilized both descriptive and inferential statistics to look at the data. The researcher used descriptive statistics like frequency, percentage, mean, and standard deviation to show how interested and confident the participants were in themselves. The researcher also employed independent samples t-tests to identify significant differences between pupils at School B who were exposed to ICT and those at School A who were not. The researcher also employed Pearson correlation analysis and point-biserial correlation to examine the strength and direction of the associations among ICT exposure, interest in STEM, and self-efficacy. SPSS was used for all statistical analyses, establishing the significance level at $p < .05$.

The research adhered to ethical norms and relevant data privacy regulations, specifically the Philippine Data Privacy Act of 2012 (Republic Act No. 10173). Ethical measures included getting formal permission from the schools that were taking part, getting informed consent from students and their parents or legal guardians, keeping all responses private by anonymizing them and securely storing all data, and making sure that participation was voluntary, meaning that students could leave at any time without penalty. The data collected was only employed for research purposes, and measures were implemented to safeguard it from unauthorized access or sharing.

The study's outcomes were anticipated to yield empirical data concerning the impact of exposure to ICT subjects on the interest and self-efficacy of Grade 10 students in pursuing the STEM strand. The results aimed to impact educational policy, guide curriculum development, and support the implementation of the MATATAG Curriculum, demonstrating how early integration of ICT may enhance Filipino children's readiness for STEM education and future employment.

Locale of the Study

This research was conducted in two private junior high schools located in Calamba City, Laguna, Philippines, selected based on their accessibility and relevance to the study. One of the schools was chosen because my son is currently enrolled there, where ICT is integrated into the curriculum, and he plans to continue in the same institution for Senior High School under the STEM strand. In contrast, the second school was included through a close acquaintance whose child is also pursuing the STEM strand in a private school without ICT integration, allowing for a meaningful comparison between the two settings. Gaining permission to conduct the study was relatively manageable since both institutions are private schools, and my status as an alumnus of one of them facilitated coordination and access. To protect privacy and comply with the Data Privacy Act of 2012, the actual names of the schools are not disclosed; instead, they are referred to as School A and School B. Both institutions offer junior high school programs as well as senior high school academic tracks, including the Science, Technology, Engineering, and Mathematics (STEM) strand.

School A is a high school that doesn't officially teach ICT-related subjects in junior high school. The main courses that students at this school learn include math, science, and other basic academic subjects such as TLE (Technology and Livelihood Education). There are no specific classes for computer programming or other ICT-related subjects however some fundamentals of the ICT might have integrated on the TLE subjects. Because of this, students only learn about technology through ordinary classroom activities and not through structured ICT lesson plans.

On the other hand, School B is a secondary school that includes ICT-related disciplines in its junior high school curriculum (grades 7 to 10). This Grade 10 students learned and practiced most of the fundamentals of ICT, such as basic programming and basic computer programs throughout their junior high school. These lessons were meant to improve students' understanding of technology and how to use digital tools. This early exposure to ICT might help pupils feel more comfortable with technology-related learning tasks.

Choosing these two schools was a good way to look at how different levels of ICT exposure could affect students' desire and confidence in pursuing the STEM strand in senior high school. The study mandatory to discern potential disparities in

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the motivation, confidence, and preparedness of Grade 10 students from a school lacking formal ICT topics compared to their counterparts from a school that provides ICT instruction.

The study's participants were the Grade 10 students who were presently planning to choose their senior high school academic pathway. Purposive sampling was employed to choose students with and without ICT subjects. This sampling technique enabled the researcher to obtain pertinent insights into students' interest in STEM and their perceived competence in executing STEM-related tasks.

Participants

The participants of this study were the Grade 10 students from two private high schools in Calamba City, Laguna, referred to in this study as School A and School B to maintain confidentiality. These schools were selected due to their contrasting approaches to ICT integration in the junior high curriculum. School A does not offer formal ICT subjects in junior high school resulting in limited structured exposure to technology-integrated lessons, whereas School B incorporates ICT subjects, including programming, digital simulations, and technology-based projects, providing students with structured ICT exposure relevant to STEM learning.

Participants were selected through purposive sampling to ensure that all students had relevant experience with STEM subjects and, for one group, prior ICT subjects' exposure. Approximately 100 students were selected to participate, with the sample divided between the two schools: students from School A representing those without ICT subjects and students from School B representing those with ICT subjects. The number of respondents were proportional to each section and school to ensure consistent representation across the sample. Participants were coordinated through their respective advisers, who assisted in explaining the survey procedures and distributing the instruments.

Data were collected using physical paper surveys, administered directly in the classrooms. Participants received clear instructions regarding the completion of the questionnaire and were given sufficient time to respond. In compliance with the Philippine Data Privacy Act of 2012 (Republic Act No. 10173), all responses were treated with strict confidentiality. Participants' identities were anonymized, and informed consent were obtained from both students and their parents or legal guardians prior to participation. Completed surveys were securely stored and accessible only to the researcher, and the data were used solely for research purposes.

By comparing these two groups, the study aims to determine whether prior ICT subjects' exposure influences students' interest and self-efficacy in pursuing the STEM strand in Senior High School, providing empirical evidence on the role of technology-integrated curricula in shaping students' readiness and confidence for STEM pathways.

Instrument of the Study

The main tool for this study was questionnaire crafted by the researcher to find out how interested, confident, and aware students are about the Science, Technology, Engineering, and Mathematics (STEM) strand. The tool employed a five-point Likert scale, from 1 (Strongly Disagree) to 5 (Strongly Agree), to measure the degree of agreement for each statement and the level of interest and self-efficacy of the students from 1(very low) to 5 (very high) The questionnaires were evaluated on the two principal aspects: students' self-efficacy and interest in engaging with STEM-related

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disciplines, including mathematics, physics, chemistry, biology, information and communications technology (ICT), and research, as well as their awareness of the significance, opportunities, and prospective career trajectories associated with the STEM strand in senior high school.

Before administration, the instrument underwent a stringent validation process by experts in ICT, STEM education, and educational research to guarantee its clarity, correctness, and compatibility with the study's objectives. A pilot test was administered to a limited cohort of Grade 10 students who were not engage in the primary study. The questionnaire was validated by three experts in the field of science. They are professors from FEU Roosevelt, City College of Calamba and Calamba Science High School.

There are three parts to the 10-item 5-point Likert scale questionnaire: Section 1: Basic comprehension of ICT themes, Section 2: STEM Track Interest, and Section 3: STEM Track Self-efficacy. A quantitative research approach was deemed the most appropriate for this study, as it enables the researcher to objectively evaluate and compare students' levels of interest and self-efficacy using numerical data. This strategy helped find big differences between groups, as between schools, genders, or ICT knowledge, by using statistical analysis to find patterns and links between variables. The quantitative approach provided a systematic, replicable, and objective methodology for data collecting, so ensuring the dependability and generalizability of the findings to the wider community.

Additionally, the quantitative (comparative/correlation) design corresponds with the study's objective, which is to ascertain the elements that affect students' attitudes and interest in pursuing the STEM strand. By utilizing this approach, the researcher could systematically compare mean scores and examine group differences in an empirical method and correlate variables to determine the direction of the trend. The findings of this analysis were anticipated to yield significant insights that could inform the enhancement of curriculum design, the improvement of STEM-related instructional practices, and the direction of career orientation programs in secondary school.

The 5-point Likert scale used In Section 1 Basic understanding of ICT topics, Section 2: STEM Track Interest and Section 3: STEM Track Self-efficacy is as follows:

Mean Range	Verbal Interpretation	Level
4.21 to 5.00	Strongly Agree	Very High
3.41 to 4.20	Agree	High
2.61 to 3.40	Neutral	Moderate
1.81 to 2.60	Disagree	Low
1.00 to 1.80	Strongly Disagree	Very Low

Data Gathering Procedure

Before collecting data, the researcher sought formal permission from the principals of the schools that participated and permission from the parents and students who took part in the study. Request letter outlining the nature of the research, objectives, and importance was submitted to school administrators to secure approval for conducting the survey among Grade 10 students. After getting approval from the administration, the researcher coordinated with the class advisers or topic teachers to determine the best times to hand out the questionnaire during regular class time.

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Before the administration of the questionnaire, parental consent forms were sent to the parent-teacher group chat asking for their approval, distributed to the student participants and retrieved immediately to ensure that ethical standards are followed.

The researcher directly instructed the teacher on administering the questions. At the school's request, only the teacher designated by the principle or administration will administer and facilitate the survey to student participants in their classes during the scheduled data collection. The instructor elucidated the study's objective, the format of the questionnaire, and the method for responding to each query at the outset of the session. The instructions were articulated properly to prevent confusion or misinterpretation. Furthermore, the school curriculum for the STEM track was included alongside the surveys. The curriculum is not included in the appendices due to the school's desire for anonymity in this research. The student participants were informed that their involvement was voluntary and that they might decline or withdraw at any point without facing any academic or personal consequences. The researcher also highlighted that all responses will be maintained in absolute confidentiality and utilized solely for research purposes.

The validated researcher-developed questionnaire was distributed in printed format by the teacher, as advised by the principal/school administration, to guarantee that all participants completed it discreetly. Their instructor was apprised of the methodology for administering and facilitating the questionnaire. The STEM curriculum of Schools A and B serves as an auxiliary resource for students to align their interests and self-efficacy with the STEM pathway. The curriculum is irrelevant to this study as the schools mandated that all replies be kept anonymous. Each student was allotted around 20 to 30 minutes to complete the questionnaire. Upon completion of the surveys, they were promptly collected and examined to ensure completeness and proper organization for data entry. To guarantee the accuracy and integrity of the data, only fully completed and properly coded forms were incorporated into the statistical analysis.

The obtained data were input into spreadsheet programs such as Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) for accurate counting and analysis. The researcher utilized coding processes aligned with the five-point Likert scale specified in the instrument to quantify the qualitative responses. To ensure data security and confidentiality, all electronic files were stored in folders accessible solely to the researcher via a password. In accordance with ethical data security regulations, physical copies of the surveys were secured in a locked cabinet and disposed of appropriately once the study concluded.

The researcher examined and verified the data to confirm its accuracy and detect any missing or inconsistent entries. The completed dataset was subjected to appropriate statistical analysis and interpretation.

Data Analysis

Both descriptive and inferential statistical methods of analysis were utilized to dig deeper into the data gathered that answer the research questions.

1. To answer **Research Problem 1** What is the profile of the Grade 10 students in terms of sex and whether the students had ICT subjects or without ICT subjects in the junior high school, the data were treated with descriptive statistics **frequency and percentage distribution** to show how much they have been exposed to ICT subjects in their schools. These descriptive metrics enabled the researcher to discern overarching trends,

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patterns, and variances across participants, thus establishing a fundamental comprehension of the data before the execution of inferential studies.

2. To evaluate **Research Problems 2 and 3** What is the level of interest and self-efficacy of Grade 10 students in pursuing SHS STEM track with and without the ICT subject, data was treated with **weighted mean and composite mean** with corresponding verbal interpretation and level of interest and self-efficacy.
3. Inferential statistical method was utilized to answer **Research Problems 4, 5 and 6** to evaluate whether to accept or reject the null hypotheses. An **independent samples t-test** was performed to ascertain the presence of significant variations in students' sex, interest and self-efficacy between with ICT and without ICT subjects. The independent samples t-test is appropriate for this study, as it assesses the mean scores of two distinct groups, providing evidence concerning the statistical significance of the observed differences or the probability of their occurrence by chance.
4. Furthermore, the **Pearson Product-Moment Correlation Coefficient (r)** was employed in **Research Problem 7** to assess the strength and direction of the association between students with ICT and without ICT subjects and their interest and self-efficacy in STEM. When one variable is dichotomous, like with ICT subjects (coded as 1 = exposed, 0 = not exposed), a point-biserial correlation was used. The point-biserial correlation is a specific variant of the Pearson correlation that enables the researcher to assess the relationship between a binary independent variable and a continuous dependent variable, shedding light on how the availability or lack of ICT subjects affects students' motivation, confidence, and competence in STEM disciplines.

The Statistical Package for the Social Sciences (SPSS) was used for all statistical studies, and Microsoft Excel as a backup if needed. The statistical significance threshold was established at $p < 0.05$, guaranteeing that the findings are analysed with a 95% confidence level. By using both descriptive and inferential statistical methods, including independent t-tests and point-biserial correlation analyses, the study provided a full and strong picture of how students' interest and self-efficacy change and how they are related to each other. This all-encompassing method allowed the researcher to pinpoint significant disparities among schools and evaluate the possible influence of ICT subjects on students' preparedness and confidence in pursuing the STEM strand.

Ethical Considerations

This study complied with the ethical standards established by the American Psychological Association (APA, 2020) and other pertinent institutional regulations about research with human subjects. The researcher guaranteed that the study adhered to the tenets of respect for persons, beneficence, and justice, protecting the rights, dignity, and welfare of all participants during the research process.

Voluntary Participation and Informed Consent. This study was completely optional. No student, teacher, or parent was forced or pressured to take part in the study. Before the researcher begins data collection, they were provided with a comprehensive explanation of the study's objectives, methodologies, potential risks, and anticipated benefits.

Students and their parents or legal guardians were required to read and sign an informed consent form, signifying their comprehension of the study and their

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consent to participate. In the same way, teachers who choose to act as proctor also received an informed consent form. Participants were made aware of their entitlement to withdraw from the study at any moment without incurring penalties or adverse repercussions.

Keeping identity and information private. To ensure the privacy of both participants and schools, strict confidentiality measures were followed. Schools were referred to by codes (e.g., **School A**, **School B**) to protect their identity. Participants' personal information, such as names, student ID numbers, or contact details, were **not** collected or shared.

Each participant was assigned a unique coded identifier to maintain anonymity during data collection, analysis, and reporting. Only gender information was recorded, and **only if the participant voluntarily consents** to provide it.

All data were stored securely in password-protected digital files and locked physical storage accessible only to the researcher. The data was used solely for academic purposes and erased after a specified period in accordance with the institution's data protection policy.

This approach ensures that both student and school identities remain confidential without affecting the objectives or outcomes of the research.

Responsible Use and Data Protection. All data collected during the study was managed in accordance with institutional and legal data protection regulations. The researcher ensures that the data are only used for research and academic reasons and not shared, copied, or published without permission. To keep information safe, data security rules were followed to stop breaches or misuse.

The researcher adhered to the rules of academic honesty, including those against plagiarism and anti-piracy. The researcher shall uphold the utmost standards of academic integrity during the entire study procedure. Plagiarism, making up facts, or lying about them were not tolerated. Proper due credit and citations to all sources of information, ideas, and resources in the right way were applied, following the rules set out in the APA 7th edition.

Only items that were lawfully obtained and have the right licenses for, such as software, journal articles, and teaching tools were utilized. The researcher did not duplicate or share copyrighted materials without permission.

Right to Leave. Participants were reminded that they are free to leave at any time and do not have to provide a reason. Dropping out of the study will not affect their academic standing or association with the institution in any way.

Ethical Approval. Before the research begins, the proposal, which includes consent forms, information sheets, and tools for collecting data, were sent to the Dean, Proposal Défense panel and the Research coordinator for assessment and approval. The study commences solely upon obtaining formal ethical approval from the committee.

RESULTS

Research Question No. 1. Profile of the students with respect to

1.1 Sex

1.2 With ICT and without the ICT subject

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Table 1.1
Profile of the Students with Respect to Sex

Sex	Frequency	Percentage
Male	47	47
Female	53	53
Total	100	100

Table 1.2
Profile of the Students with Respect to With ICT and Without ICT Subjects

	Frequency	Percentage
With ICT Subject	50	50
Without ICT Subject	50	50
Total	100	100

Research Question No. 2. Level of interest of Grade 10 students in pursuing SHS STEM with and without the ICT subjects.

Table 2
Level of Interest of Grade 10 Students in Pursuing the SHS Track with and without the ICT subjects

Level of Interest	**With ICT Subject**		**Without ICT Subject**	
	WM	**VI**	**WM**	**VI**
1. Taking the STEM track in senior high school.	3.52	A	4.12	A
2. Learning science topics in school.	3.78	A	3.60	A
3. Learning mathematics lessons.	3.58	A	3.96	A
4. Doing science experiments and activities	3.94	A	3.72	A
5. Solving problems that require logical and critical thinking skills.	3.78	A	3.76	A
6. Learning how things work more easily and efficiently in everyday life.	4.10	A	3.40	**N**
7. Applying scientific formulas in solving mathematical issues in real-life situations.	3.46	A	3.74	A
8. Exploring environmental processes and climate changes	3.68	A	3.60	A
9. Using applied robotics and engineering for learning.	3.62	A	3.44	A
10. Watching or reading science or technology-related content	3.74	A	3.94	A
Composite Mean	**3.72**	A	**3.73**	A

Legend: 5(4.21-5.00) - Strongly Agree (SA), 4(3.41-4.20) – Agree (A),3(2.61-3.40)-Neutral (N), 2(1.81-2.60)- Disagree (D), 1(1.00-1.80)-Strongly Disagree (SD)

Research Question No. 3. Level of self-efficacy of Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects.

Table 3
Level of self-efficacy of Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects.

Level of Self-Efficacy	With ICT Subject		Without ICT Subject	
	WM	**VI**	**WM**	**VI**
1. I understand science lessons in high school	4.12	A	4.00	A
2. I can solve difficult math problems if I practice.	3.92	A	4.06	A
3. I can practice my science knowledge and skills.	3.84	A	4.08	A
4. I can follow and perform scientific procedures correctly.	4.04	A	3.48	A
5. I can analyze information and conclude from the given data.	3.88	A	3.70	A
6. I can use scientific formulas to solve real-life problems.	3.96	A	3.22	**N**
7. I can share and explain my science or math ideas with my classmates.	3.30	**N**	3.56	A
8. I am ready to learn engineering technology, robotics, and different digital tools.	3.58	A	3.38	**N**
9. I can do well in STEM subjects in senior high school	3.20	**N**	3.42	A
10. STEM track will help me in developing my interests and skills needed for my future career.	3.34	**N**	4.28	SA
Composite Mean	3.72	A	3.72	A

Legend: 5(4.21-5.00) - Strongly Agree (SA), 4(3.41-4.20) – Agree (A),3(2.61-3.40)-Neutral (N), 2(1.81-2.60)- Disagree (D), 1(1.00-1.80)-Strongly Disagree (SD)

Research Question No. 4. Difference in the Level of Interest and Self-efficacy of the Grade 10 Students in pursuing the SHS STEM track with and without the ICT subjects when grouped according to sex.

Table 4
Difference in the Level of Interest and Self-efficacy of the Grade 10 Students in pursuing the SHS STEM track with and without the ICT subjects when grouped according to sex.

Profile	Mean	Computed T-Value	p-value	Decision	Interpretation
With ICT Subjects					
Sex					
Male	3.83	1.397	0.169	Do not reject the hypothesis.	Not Significant
Female	3.59				
Without ICT Subjects					
Sex					
Male	3.83				

Female	3.61	1.251	0.217	Do not reject the hypothesis.	Not Significant

Note: p-value ≤ 0.05 – significant, p-value > 0.05 – not significant

Research Question No. 5. Difference in the Level of Interest of the Grade 10 Students in Pursuing the SHS STEM Track with and without the ICT subjects

Table 5
Difference in the Level of Interest of the Grade 10 Students in Pursuing the SHS STEM Track with and without the ICT subjects

Profile	Mean	Computed T-Value	p-value	Decision	Interpretation
With ICT Subjects	3.72	0.018	0.985	Do not Reject the Hypothesis	Not Significant
Without ICT Subjects	3.72				

Note: p-value ≤ 0.05 – significant, p-value > 0.05 – not significant

Research Question No. 6. Difference in the level of self-efficacy of Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects.

Table 6
Difference in the level of self-efficacy of Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects.

Profile	Mean	Computed T-Value	p-value	Decision	Interpretation
With ICT Subjects	3.72	0.088	0.930	Do not Reject the Hypothesis.	Not Significant
Without ICT Subjects	3.72				

Note: p-value ≤ 0.05 – significant, p-value > 0.05 – not significant

Research Question No. 7. Relationship between the level of interest and self-efficacy of the Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects.

Table 7
Relationship between the level of interest and self-efficacy of the Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects.

Variable	**Computed Pearson r Value**	**Description**	**p-value**	**Decision**	**Interpretation**
With ICT Subject					
Level of Interest vs	0.720	High Correlation	0.001	Reject the	Significant

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Level of Self-Efficacy				Hypothesis	
Without ICT Subject					
Level of Interest vs Level of Self-Efficacy	-0.263	Low Correlation	0.065	Do not Reject the Hypothesis	Not Significant

Note: p-value ≤ 0.05 – significant, p-value > 0.05 – not significant

Scale of correlation coefficient	Value
$0 < r \leq 0.19$	Very Low Correlation
$0.2 \leq r \leq 0.39$	Low Correlation
$0.4 \leq r \leq 0.59$	Moderate Correlation
$0.6 \leq r \leq 0.79$	High Correlation
$0.8 \leq r \leq 1.0$	Very High Correlation

Research Question No. 8. Proposed program based on the findings of the study.

Below is the detailed ICT**-Integrated STEM Learning Enhancement Program (ISLEP)** proposed by the researcher based on the results of the study.

Proposed Program:
ICT-Integrated STEM Learning Enhancement Program (ISLEP)

Component	Activity (Teachers & Students)	Objectives	Strategies	Persons Involved	Resources	Time Frame	Success Indicator
PHASE 1: Pre-Implementation of the Program ISLEP							
Teacher Training on Technology Integration	Teachers attend seminars, workshops, and demonstration classes on digital teaching tools, programming basics, and interactive simulations.	Improve teachers' competence and confidence in integrating ICT tools in STEM instruction.	Conduct professional development training, peer demonstration lessons, and continuous learning workshops.	School administrators, teachers, ICT trainers, educational technology experts	Training modules, laptops, projectors, online training platforms, simulation software	At least once every semester or during in-service training days	Teachers effectively integrate ICT tools in lessons; improved classroom engagement and innovative teaching practices
Curriculum Alignment with MATATAG	Teachers review and revise lesson plans to integrate ICT	Ensure ICT integration supports national curriculum standards	Curriculum mapping, periodic curriculum review meetings, integration	School administrators, curriculum coordinators, teachers,	MATATAG curriculum guides, curriculum mapping templates,	Beginning of each academic year with periodic reviews	Updated curriculum plans showing ICT integration; improved

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Standards	competencies aligned with STEM learning outcomes; students engage in ICT-supported STEM activities.	and enhances STEM education.	of digital learning competencies in STEM subjects.	education supervisors	planning documents		alignment of ICT and STEM learning objectives
Parental Engagement and Awareness	Teachers conduct parent orientation sessions about ICT learning; parents encourage students to practice digital skills at home.	Strengthen students' motivation and confidence in ICT and STEM through family support.	Organize seminars, distribute informational brochures, create communication channels for parents.	Parents, teachers, school administrators, PTA	Printed guides, presentation materials, communication platforms, workshop venues	Once or twice per school year	Increased parental participation in school programs; improved student support for ICT learning at home
PHASE 2: Program Implementation *of the Program ISLEP*							
Integrate ICT Courses Early in the Curriculum	Teachers introduce basic ICT concepts such as digital literacy, word processing, presentations, and simple programming; students complete guided computer activities and projects.	Equip students with foundational ICT skills and stimulate early interest and confidence in STEM learning.	Embed ICT lessons in Grade 7 subjects; use project-based learning and interactive digital tools; integrate computer laboratory sessions.	School administrators, ICT teachers, subject teachers, students	Computer laboratory, laptops/desktops, internet connection, learning management systems, ICT modules	Start of Junior High School and implemented continuously throughout the school year	Students demonstrate basic ICT competencies; improved participation in technology-based activities; higher interest in STEM subjects
Develop a STEM Readiness Program	Teachers organize coding clubs, robotics sessions, STEM fairs, and project-based STEM learning; students design simple applications, build robotics models, and	Strengthen students' STEM interest, creativity, and confidence through hands-on learning experiences.	Establish STEM clubs, conduct workshops, integrate inquiry-based learning, and organize inter-school STEM competitions.	STEM teachers, ICT coordinators, school administrators, students, external STEM facilitators	Robotics kits, microcontrollers, coding platforms, laboratory materials, STEM learning kits	Implemented throughout the academic year with scheduled club meetings and quarterly events	Increased participation in STEM activities; improved problem-solving skills; student projects demonstrating application of ICT concepts

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	participate in STEM competitions.						
Peer Mentoring and ICT Support Groups	Students with advanced ICT skills guide peers during computer laboratory sessions; teachers supervise mentoring activities and group projects.	Improve ICT self-efficacy and collaborative learning among students.	Establish peer tutoring programs, group-based technology projects, and ICT help desks for students.	Students, ICT teachers, subject teachers, school guidance counsellors	Computer laboratory, collaborative software tools, mentoring guidelines	Conducted weekly during ICT classes or club meetings	Increased student confidence in ICT tasks; improved collaboration and reduced technology-related anxiety
Continuous Assessment and Feedback	Teachers administer quizzes, digital assessments, and project evaluations; students receive regular feedback on ICT-related tasks.	Monitor student progress in ICT competencies and maintain motivation in STEM learning.	Use formative and summative assessments, digital learning platforms, and performance-based evaluation.	Teachers, students, school administrators	Assessment tools, online quiz platforms, rubrics, student portfolios	Conducted every grading period or quarterly	Improvement in ICT skill assessments; positive feedback from students regarding learning progress
PHASE 3: Post-Implementation *of the Program ISLEP*							
Post-Assessment Test & Evaluation	Teachers administer a comprehensive post-assessment test covering ICT skills, STEM knowledge, and problem-solving abilities.	Measure overall student learning outcomes, motivation, and readiness for STEM track selection.	Conduct standardized tests, project evaluations, and self-report surveys; analyze results for insights.	Teachers, students, school administrators	Assessment tools, survey forms, digital evaluation platforms	End of program/year	Students demonstrate improved ICT competencies, STEM interest, and ability to make informed senior high school track choices

Post-Assessment Tool: ICT-STEM Program Evaluation (Likert Scale)
This assessment is designed to evaluate the success of the **Integrated STEM**

Learning Enhancement Program (ISLEP)program. Your responses will help determine how well the program improved your ICT skills, STEM interest, motivation, and readiness for senior high school STEM track. All data collected will be used to evaluate the program and make improvements for future students.

Instructions:
Please indicate your level of agreement with the following statements as the results of our STEM awareness program.

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

A. Rating their Interest in STEM I am interested in:	**Strongly disagree (1)**	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly agree (5)**
1. Taking the STEM track in senior high school	☐	☐	☐	☐	☐
2. Learning science topics in school	☐	☐	☐	☐	☐
3. Learning mathematics lessons	☐	☐	☐	☐	☐
4. Doing science experiments and activities	☐	☐	☐	☐	☐
5. Solving problems that require logical and critical thinking skills	☐	☐	☐	☐	☐
6. Learning how things work more easily and efficiently in everyday life	☐	☐	☐	☐	☐
7. Applying scientific formulas in solving real-life problems	☐	☐	☐	☐	☐
8. Exploring environmental processes and climate changes	☐	☐	☐	☐	☐
9. Using applied robotics and engineering for learning	☐	☐	☐	☐	☐
10. Watching or reading science or technology-related content	☐	☐	☐	☐	☐
B. Rating their Motivation in STEM and ICT Learning I understand that:	**Strongly disagree (1)**	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly agree (5)**
1. I am motivated to participate in ICT and STEM-related activities	☐	☐	☐	☐	☐
2. ICT lessons make STEM subjects more interesting	☐	☐	☐	☐	☐
3. I enjoy working on STEM projects using ICT tools	☐	☐	☐	☐	☐
4. I feel encouraged to explore STEM topics outside the classroom	☐	☐	☐	☐	☐
5. I am confident in applying ICT skills in my schoolwork	☐	☐	☐	☐	☐
6. I am motivated to improve my problem-solving skills	☐	☐	☐	☐	☐
7. I feel excited about participating in robotics or coding activities	☐	☐	☐	☐	☐
8. I am confident in using digital tools for learning STEM concepts	☐	☐	☐	☐	☐

9. I enjoy collaborating with classmates on STEM projects	☐	☐	☐	☐	☐
10. I feel ICT-STEM activities help me prepare for my senior high school track	☐	☐	☐	☐	☐

C. Rating their ICT Competency / Skills I am confident that:	**Strongly disagree (1)**	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly agree (5)**
1. I can use word processing software effectively	☐	☐	☐	☐	☐
2. I can create presentations with proper formatting and visuals	☐	☐	☐	☐	☐
3. I can write and debug a simple program or code	☐	☐	☐	☐	☐
4. I can use spreadsheets to organize and analyze data	☐	☐	☐	☐	☐
5. I can complete ICT-based STEM projects independently	☐	☐	☐	☐	☐
6. I can solve STEM problems using ICT tools	☐	☐	☐	☐	☐
7. I feel confident using robotics kits or engineering tools	☐	☐	☐	☐	☐
8. I can collaborate digitally with classmates for projects	☐	☐	☐	☐	☐
9. I can research and gather information online effectively	☐	☐	☐	☐	☐
10. I can apply ICT knowledge to real-life STEM problems	☐	☐	☐	☐	☐
D. Rating their STEM Track Readiness / Decision-Making I am confident that	**Strongly disagree (1)**	**Disagree (2)**	**Neutral (3)**	**Agree (4)**	**Strongly agree (5)**
1. I am prepared to choose the STEM track in senior high school	☐	☐	☐	☐	☐
2. I understand what subjects I need for STEM track success	☐	☐	☐	☐	☐
3. I can apply my ICT/STEM skills in senior high school courses	☐	☐	☐	☐	☐
4. I can make decisions about my academic path confidently	☐	☐	☐	☐	☐
5. I am ready to face challenges in STEM learning	☐	☐	☐	☐	☐
6. I can work effectively in teams for STEM projects	☐	☐	☐	☐	☐
7. I feel confident in problem-solving tasks in STEM courses	☐	☐	☐	☐	☐
8. I am motivated to continue improving in STEM subjects	☐	☐	☐	☐	☐
9. I feel the ICT-STEM program has prepared me for my future academic track	☐	☐	☐	☐	☐
10. I am confident about my STEM career interests and direction	☐	☐	☐	☐	☐

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Scoring & Interpretation

To evaluate the success of the ICT-STEM program, the responses for each section of the post-assessment are first converted into numerical scores. Each statement in a section is rated on a Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). The average score per section is calculated by summing all the ratings for the 10 statements in that section and then dividing the total by 10. This average provides a single score that represents the students' overall responses for that specific area, such as interest in STEM, motivation, ICT skills, or readiness for the STEM track.

This scoring method helps program managers and teachers methodically measure students' views and skills, find their strengths, and point out areas that need improvement before the program is put into action again. Then, the average is used to figure out how well the program works. The table below shows how to read and understand the findings of the evaluation instrument.

Average Score Range	Interpretation	Description
4.5 – 5.0	Highly successful / Excellent outcome	The program achieved its objectives exceptionally well; students demonstrated strong skills, motivation, and readiness.
3.5 – 4.4	Successful / Good outcome	The program met its goals effectively; students showed good progress and positive outcomes, with minor areas for improvement.
2.5 – 3.4	Moderate / Needs improvement	The program had some positive effects, but several areas require enhancement to fully achieve its objectives.
1.0 – 2.4	Low / Not effective	The program was largely ineffective; significant changes are needed to improve student outcomes and engagement.

DISCUSSION

Answering Research Question

Research Question No. 1. Profile of the students with respect to

1.1 Sex

1.2 With ICT and without the ICT subject

To determine the sex of the students in Grade 10, as well as the students with and without the ICT subject, the frequency and percentage distribution were used on the data gathered. The results are entered in Tables 1.1 and 1.2.

As revealed in **Table 1.1** the distribution of the respondents according to sex, out of the 100 students who participated in the study, 47 were male and 53 were female. This indicates that female students represent the larger proportion of the respondents in the sample. The result shows that the study included participants from both sexes, allowing perspectives from both male and female students to be represented in the research.

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The outcome corresponded with the figures in the National Capital Region (NCR) School Enrolment Dashboard 2024-2025 as of January 30, 2025, indicating that there were 107,061 female grade 10 students and 106,707 male grade 10 students.

As shown in **Table 1.2** the distribution of students according to whether they are taking an ICT subject or not reveals that 50 students (50%) are enrolled in subjects with ICT, while the other 50 students (50%) are enrolled in subjects without ICT. This equal distribution indicated that the sample is balanced, allowing the researcher to make fair comparisons between students who are exposed to ICT subjects and those who are not. This balance enhances the reliability and objectivity of the investigation regarding the effects or disparities associated with ICT exposure.

The updated Edukasyong Pantahanan at Pangkabuhayan/Technology and Livelihood Education (EPP/TLE) curriculum of 2018 enhances ICT integration via project-based learning, robotics initiatives, and enhanced internet connectivity, anticipated to encompass 78% of public schools by 2025 (Academ-e, 2023; Villanueva, 2025). Research indicated that substantial ICT engagement markedly improves students' motivation, curiosity, and self-efficacy in STEM disciplines, providing them with the technical and cognitive abilities essential for higher education and technology-oriented employment.

Boholano et al. (2021) asserted that technology-based teaching and learning provide students with 21st-century abilities. The integration of ICT in education had positively transformed and influenced the practices and methodologies of all forms of active engagement inside educational institutions.

Similarly, Ongco (2025) determined in his research that enhanced effectiveness, efficiency, and accessibility of ICT integration in the educational process yields superior student performance, elevates student competency, and contributes to the advancement of the nation's educational system and ICT infrastructure.

Research Question No. 2. Level of interest of Grade 10 students in pursuing SHS STEM with and without the ICT subjects.

To determine the interest level of Grade 10 pupils with and without the ICT topic, the collected data was analyzed using a weighted mean, accompanied with the matching verbal interpretation presented at the bottom of the table. The outcome is displayed in Table 2.

Shown in **Table 2** is the level of interest of Grade 10 students in pursuing the STEM track in senior high school, comparing those who are taking an ICT subject and those who are not. The results shows that students from both groups generally have a **high level** of interest, as reflected in the composite mean scores of 3.72 for students with ICT subjects and 3.73 for students without ICT subjects. Both composite means fell under the verbal interpretation "**Agree**," indicating that students from both groups are interested in STEM-related learning and activities.

Among students with ICT subjects, the highest level of interest is observed in learning how things work more easily and efficiently in everyday life (WM = 4.10, A), followed by doing science experiments and activities (WM = 3.94, A). These results suggests that students exposed to ICT subjects may show strong interest in practical applications of science and technology. Meanwhile, students without ICT subjects express the highest interest in taking the STEM track in senior high school and engaging with science and technology-related media. This suggested that even without direct ICT exposure, students may still perceive STEM as important for their

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future goals (attainment value) or as a pathway aligned with their academic aspirations. Their interest in consuming STEM-related content may also reflect intrinsic value, indicating curiosity and enjoyment in learning about science and technology topics.

Furthermore, it was notable that students without ICT subjects shows a neutral response (WM = 3.40, N) toward learning how things work more easily and efficiently in everyday life suggesting **Moderate** level while the rest of the indicators are interpreted as “agree," indicating high level. The overall motivation toward STEM remains positive. The neutral response among students without ICT subjects regarding learning how things work more easily and efficiently in everyday life may indicate **Moderate** level, perceived utility value for practical technological applications compared with those exposed to ICT. For students without ICT subjects, the highest level of interest is seen in taking the STEM track in senior high school (WM = 4.12, A) and watching or reading science and technology-related content (WM = 3.94, A). This indicates that even without ICT exposure, students still demonstrate a strong inclination toward STEM-related topics and future academic pathways.

Overall, in relation to Expectancy-Value Theory, the findings suggests that students’ interest in STEM is strongly influenced by the value they assign to STEM-related activities and future opportunities, rather than solely by their exposure to ICT subjects. While ICT learning may strengthen students’ perception of the practical usefulness of STEM, both groups still recognized the importance and appeal of STEM, which helps sustain their motivation to pursue STEM-related academic tracks.

According to Cherry, 2020, the integration of Information and Communication Technology (ICT) in education had transformed how students learn, particularly in the Science, Technology, Engineering, and Mathematics (STEM) tracks. Alongside ICT, a student’s level of self-efficacy and interest plays a critical role in academic performance. Self-efficacy, a key concept in Albert Bandura’s Social Cognitive Theory (SCT) posits that learning is shaped through the interaction of personal, behavioural, and environmental factors, highlighting the dynamic role of social influences and cognitive processes in education.

Additionally, Guevarra's (2024) study find that students' passions and hobbies have a major role in how they make decisions. Many students chose a course of study based on topics they find interesting or have a natural aptitude for. For instance, students who are enthusiastic about the arts or humanities may choose the Arts and Design or Humanities and Social Sciences (HUMSS) strand, whereas those who are interested in technology and engineering typically choose the STEM (Science, Technology, Engineering, and Mathematics) strand. By matching their course to their interests, students can stay motivated and involved, which improved their odds of success.

Research Question No. 3. Level of self-efficacy of Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects.

To find out the level of self-efficacy of Grade 10 students in pursuing SHS STEM track when grouped according to their exposure to ICT subjects the gathered data is treated with the weighted mean, composite mean and verbal interpretation is used to describe their responses as given at the bottom of the table. The result is entered in Table 3

Presented in **Table 3** is the level of self-efficacy of Grade 10 students in relation to pursuing the STEM track in senior high school, comparing students with ICT

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subjects and those without ICT subjects. The results indicates that both groups obtain the same composite mean of 3.72, which is verbally interpreted as "Agree" indicating **High** level of self-efficacy. This indicates that, overall, students from both groups possess a positive level of confidence in their abilities to perform tasks related to science, mathematics, and STEM learning.

For students with ICT subjects, the highest weighted mean is observed in understanding science lessons in high school (WM = 4.12, A), followed by following and performing scientific procedures correctly (WM = 4.04, A). These results suggests that students exposed to ICT subjects may feel more confident in understanding and performing science-related tasks. However, some indicators such as sharing and explaining science or math ideas with classmates (WM = 3.30, N), doing well in STEM subjects in senior high school (WM = 3.20, N), and developing interests and skills for future careers through STEM (WM = 3.34, N) are rated neutral, indicating **Moderate** level of confidence in these areas.

For students without ICT subjects, the highest rating is seen in the statement, "STEM track will help me develop my interests and skills needed for my future career" (WM = 4.28), which is interpreted as Strongly Agree (SA) indicating **Very High level**. This suggested that these students strongly believe that pursuing STEM will benefit their future career development. However, they show neutral responses in using scientific formulas to solve real-life problems (WM = 3.22, N) and readiness to learn engineering technology, robotics, and digital tools (WM = 3.38, N), which implies **Moderate level** and may indicate less confidence in applying technical or technology-related skills, potentially affecting their future performance in STEM fields, particularly in areas such as problem-solving, innovation, and adaptability in rapidly evolving technological environments.

Overall, the findings indicates that both groups of students demonstrate a similar and positive **High level** of self-efficacy toward STEM learning, regardless of whether they are enrolled in ICT subjects. While students with ICT subjects incline to show confidence in scientific procedures and understanding of lessons, students without ICT subjects appear to have stronger beliefs in the long-term career benefits of the STEM track.

The findings present in Table 3 can be interpreted using the Self-Efficacy Theory of Albert Bandura. According to Bandura, self-efficacy referred to an individual's belief in their capability to organize and execute the actions required to achieve specific tasks or goals. These beliefs strongly influence how individuals think, feel, motivate themselves, and behave in academic or career-related contexts. In education, students with higher self-efficacy are more likely to approach challenging tasks with confidence, will continue when difficulties arise, and achieve better performance in learning activities. The overall composite mean of 3.72 (Agree) suggests that Grade 10 students generally believe they can handle STEM-related tasks and challenges.

Bandura's theory also explained that self-efficacy develops through several main sources: mastery experiences (successful performance of tasks), vicarious experiences (observing others succeed), verbal persuasion (encouragement from teachers or peers), and physiological or emotional states. These sources shapes students' confidence in their abilities and their willingness to engage in specific academic fields such as STEM.

Han & Knowles (2021) in their study stated that social, motivational, and instructional factors impact students' outcomes in STEM learning and their career paths. Based on prior research and expectancy-value theory, the study further

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explored how multiple factors affect students in the context of integrated STEM learning. The results of their study revealed direct and indirect effects of teacher self-efficacy and outcome expectancy on students' STEM knowledge achievements. Student STEM attitudes (self-efficacy and expectancy-value beliefs), 21st century skills, and STEM career awareness also significantly influenced STEM knowledge achievement directly or indirectly.

Similarly, in a comparative study of STEM senior high school students, Tiangco, Cruz, and Ygoña (2024) found that mastery experiences were the strongest contributor to self-efficacy. Students who experienced repeated success, even amidst challenges, reported higher confidence in their abilities, which reinforced engagement and task persistence.

Studies had shown that students with high self-efficacy are more likely to engage deeply in tasks, persist through challenges, and approach setbacks as opportunities for growth (Cherry, 2021).

Research Question No. 4. Difference in the level of interest and self-efficacy of the Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects when grouped according to sex.

To verify if there is a significant difference in the level of interest and self-efficacy of the Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects when grouped according to sex the accumulated data was subjected to **t-test** and the result was compared to 0.05 significance level. The result is entered in Table 4.

Reflected in **Table 4** is the comparison of the level of interest and self-efficacy of Grade 10 students in pursuing the SHS STEM track when grouped according to sex and whether they are taking ICT subjects or not.

For students with ICT subjects, the mean score of male students is 3.83, while female students obtained a mean score of 3.59. The computed t-value of 1.397 yielded a p-value of 0.169 which is greater than the 0.05 level of significance. Therefore, the null hypothesis is not rejected, indicating no statistically significant difference in the level of interest and self-efficacy between male and female students taking ICT subjects.

Similarly, for students without ICT subjects, male students obtained a mean score of 3.83, while female students have a mean score of 3.61. The computed t-value of 1.251 results to a p-value of 0.217 is also greater than the 0.05 level of significance. Thus, the null hypothesis is again not rejected, which means that there is no statistically significant difference in the level of interest and self-efficacy between male and female students who were not taking ICT subjects.

Overall, the results indicates that sex does not significantly influence the level of interest and self-efficacy of Grade 10 students in pursuing the SHS STEM track, regardless of whether they are enrolled in ICT subjects or not. Both male and female students show relatively similar levels of interest and confidence toward STEM-related learning and future academic paths. Sex does not appear to influence their level of interest or confidence in STEM in this group.

The findings suggests that gender does not have a major impact on the desire and self-efficacy of Grade 10 students in following the SHS STEM track, irrespective of their enrolment in ICT subjects. Male and female students exhibit comparable levels of enthusiasm and confidence toward STEM-related education and prospective

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academic trajectories. In this group, it does not appear that sex has any effect on how interested or confident they are in STEM.

The results can also be understood using the Expectancy-Value Theory put out by Jacquelynne Eccles and Allan Wigfield. This theory suggests that students' desire to engage in a specific domain is shaped by two primary factors: their anticipated success and the significance they attribute to the work. The comparable mean scores between male and female students in this study indicates that both groups may regard STEM-related learning as useful and possess confidence in their ability to succeed in it. Consequently, their interest and self-efficacy in pursuing the SHS STEM route remain consistent, irrespective of gender.

These results suggests that gender stereotypes typically linked to STEM disciplines may exert diminished influence among the participants in this study. The comparable levels of interest and self-efficacy amongst male and female students suggests that opportunities for participation in STEM education are becoming gradually inclusive and accessible for all genders.

Research Question No. 5. Difference in the level of interest of Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects.

To determine if there is a significant difference in the level of interest of Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects the data is treated with the t-test and compared the result with 0.05 significance level to decide whether to reject or not to reject the hypothesis. The result is presented in Table 5.

Shown in **Table 5** is the comparison of the levels of interest of Grade 10 students in pursuing the SHS STEM track between those who are taking ICT subjects and those who are not. The results show that both groups obtained the same mean score of 3.72, which indicates that their level of interest is practically the same.

The computed t-value is 0.018 yielded a p-value of 0.985, which is greater than the 0.05 level of significance. Based on this result, the null hypothesis is not rejected, indicating that the level of interest between students with ICT subjects and those without ICT subjects is not significantly different.

Students' decision to take an ICT subject have little influence on their interest in pursuing the STEM track in senior high school. Both groups of students demonstrate a similar level of interest in STEM-related learning and future academic pathways.

An additional explanation is provided by Expectancy-Value Theory, which states that students' motivation to pursue STEM is influenced by the value they place on STEM education and their expected success. Students with and without ICT disciplines may view STEM as equally important and feasible, thus their interest levels remain unchanged.

Research Question No. 6. Difference in the level of self-efficacy of Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects.

To ascertain if there is a significant difference in the level of self-efficacy of Grade 10 students in pursuing the SHS STEM track, both with and without the ICT subjects the data is subjected to t-test and compared with 0.05 significance level. The result is entered in Table 6.

The comparison of Grade 10 students' self-efficacy in pursuing the SHS STEM track between those who are taking ICT subjects and those who are not is shown in

Table 6. The results show that both groups receive the same mean score of 3.72, indicating that students who are taking ICT subjects and those who are not have a similar level of confidence in their abilities related to STEM learning.

The computed t-value is 0.088, with a p-value of 0.930 is greater than the 0.05 level of significance. Therefore, the null hypothesis is not rejected, indicating no significant difference in self-efficacy between the two groups of students.

This implied that enrolment in an ICT subject does not significantly affect the self-efficacy of Grade 10 students in pursuing the STEM track in senior high school. Both groups demonstrate a comparable level of confidence in their capability to understand and perform tasks related to STEM subjects.

From the perspective of Bandura's theory, this outcome implies that other sources of self-efficacy beyond ICT exposure—such as prior mastery experiences in mathematics and science, observation of peers' success in STEM, encouragement from teachers and family, or personal coping strategies—may play a more significant role in shaping students' confidence. The equal self-efficacy levels suggests that students' belief in their capability to handle STEM challenges is not solely dependent on ICT subjects but may be influenced by a broader combination of experiences and support systems.

This suggests that Grade 10 students' self-efficacy in pursuing the STEM route in senior high school was not much impacted by enrolling in an ICT course. Both groups show a similar degree of trust in their abilities to comprehend and carry out STEM-related tasks. According to Bandura's paradigm, self-efficacy is therefore a reflection of cumulative experiences and perceived competence rather than only a result of enrolling in a particular topic. Both student groups exhibit similar levels of confidence in their capacity to interact with STEM, demonstrating that confidence may be fostered through a variety of approaches rather than just technology-related education.

Research Question No. 7. Relationship between the level of interest and self-efficacy of the Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects.

To establish the relationship between the level of interest and self-efficacy of the Grade 10 students in pursuing the SHS STEM track with and without the ICT subjects the data is treated with Pearson correlation coefficient or Pearson's r. The result is compared with the p-value of 0.05. The result is reflected in Table 7.

Shown in **Table 7** is the relationship between the level of interest and the level of self-efficacy of Grade 10 students in pursuing the SHS STEM track, both for students with ICT subjects and those without ICT subjects.

For students with ICT subjects, the computed Pearson's r value is 0.720, which indicates a high positive correlation between the level of interest and self-efficacy. The p-value of 0.001 is less than 0.05, which means that the relationship is statistically significant. Therefore, the null hypothesis was rejected. This result implies that students who have a higher level of interest in STEM tend to have higher self-efficacy in performing STEM-related tasks. In other words, students who are more interested in STEM subjects are also more confident in their ability to succeed in them.

For students without ICT subjects, the computed Pearson's r value is -0.263, which indicates a low negative correlation between the level of interest and self-efficacy. The p-value of 0.065 is greater than 0.05, indicating that the relationship is not statistically significant. This means that the null hypothesis should not be rejected,

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and there is no significant relationship between the level of interest and self-efficacy among students without ICT subjects.

Overall, the findings suggested that interest and self-efficacy are strongly related among students who are taking ICT subjects, but this relationship was not evident among students who are not taking ICT subjects. This may imply that exposure to ICT-related learning could help strengthen the connection between students' interest in STEM and their confidence in performing STEM-related tasks.

From the perspective of Expectancy-Value Theory, which suggests that motivation is a function of both the expectancy of success and the subjective value of the task, the high correlation ($r = 0.720$) indicates that students with ICT exposure not only expect to succeed in STEM-related tasks but also value these tasks more highly. Their interest in ICT strengthens both their expectancy and perceived value, reinforcing their confidence and engagement in the STEM track.

For students without ICT subjects, the computed Pearson r value is -0.263, which indicates a low negative correlation between the level of interest and self-efficacy. The p-value of 0.065 is greater than 0.05, indicating that the relationship is not statistically significant. This means that the null hypothesis shall not be rejected, and there is no significant relationship between the level of interest and self-efficacy among students without ICT subjects. This implies that for students without ICT exposure, interest alone does not strongly predict self-efficacy. According to Bandura, the lack of mastery or vicarious experiences in ICT may limit students' confidence in their STEM capabilities. Similarly, Expectancy-Value Theory will suggest that even if students are interested, without adequate experiences or resources, their expectancy of success remains low, weakening the motivational connection between interest and self-efficacy.

Overall, the findings indicates that ICT exposure might have a significant role in strengthening the relationship between interest and self-efficacy. More confidence in one's abilities is substantially correlated with a greater interest in STEM among ICT students. This validates the concepts of Expectancy-Value Theory as well as Bandura's self-efficacy theory. Simply having an interest in ICT does not appear to be sufficient to increase self-efficacy in junior high school pupils who do not take ICT lessons. This demonstrates the significance of practical experiences and opportunities for skill development in fostering STEM confidence and motivation.

Research Question No. 8. Proposed program based on the findings of the study.

The **ICT-Integrated STEM Learning Enhancement Program (ISLEP) is** proposed by the researcher based on the results of the study. Based on the findings of the study, a program is proposed to enhance the interest and self-efficacy of students in pursuing the STEM track while raising awareness of STEM opportunities among both Grade 9 and Grade 10 students. The program aims to prepare students for STEM-related learning and future career pathways by integrating practical activities, ICT tools, and career guidance.

Summary of Findings

Among the important findings of this research were:

1. **Profile of the Students.** Out of 100 Grade 10 students, 47% were male and 53% were female, indicating a slightly higher representation of female students in the sample. The students were equally distributed between those enrolled in

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ICT subjects (50%) and those not taking ICT subjects (50%), allowing for balanced comparison in the study.

2. **Level of Interest.** Both students with ICT subjects (WM = 3.72, Agree) and students without ICT subjects (WM = 3.73, Agree) showed a high level of interest in pursuing the STEM track. Students with ICT subjects demonstrated strong interest in practical STEM activities such as doing science experiments and learning how things work in everyday life. Students without ICT subjects showed high interest in taking the STEM track itself and engaging with science and technology-related content.
3. **Level of Self-Efficacy.** Both groups of students showed a positive level of self-efficacy (WM = 3.72, Agree), indicating confidence in their ability to succeed in STEM-related learning. Students with ICT subjects were more confident in understanding science lessons and performing scientific procedures. Students without ICT subjects were more confident in the long-term benefits of the STEM track for future career development.
4. **Differences by Sex.** There were no significant differences in the level of interest and self-efficacy between male and female students, regardless of ICT enrolment ($p > 0.05$). This indicates that sex does not influence students' interest or confidence in pursuing STEM.
5. **Differences in interest.** No significant differences were found in the level of interest between students with and without ICT subjects ($p > 0.05$). This suggests that taking an ICT subject does not significantly affect the overall interest of Grade 10 students toward pursuing STEM Strand in the senior high school.
6. **Difference in self-efficacy**. No significant differences were found in the level of self-efficacy between students with and without ICT subjects ($p > 0.05$). This implies that taking an ICT subject does not significantly affect the overall level of self-efficacy of Grade 10 students in pursuing STEM strand in the senior high school.
7. **Relationship between Interest and Self-Efficacy.** Among students with ICT subjects, there was a high positive correlation between interest and self-efficacy ($r = 0.720$, $p < 0.05$), indicating that higher interest is associated with higher confidence in STEM tasks. Among students without ICT subjects, the correlation was low and not significant ($r = -0.263$, $p > 0.05$), suggesting that interest and self-efficacy are not strongly related in this group.

Conclusions

Based on the foregoing findings, the following conclusions were drawn:

1. Most of the grade 10 students who answered are girls. The National Capital Region (NCR) School Enrolment Dashboard for 2024–2025 showed that the difference was quite small. The same number of male and female responses means that the sample is balanced, which lets the researcher make fair comparisons between students who have taken ICT classes and those who have not. This balance made the study more reliable and objective when it came to looking at the effects or differences that came from being exposed to ICT.
2. Grade 10 students, irrespective of ICT enrollment, exhibited significant enthusiasm in pursuing the STEM pathway. This corroborated Bandura's self-efficacy theory, emphasizing that students' confidence in their capabilities boosts motivation and involvement in demanding STEM activities. Long-term

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interest, along with a strong sense of self-efficacy, was likely to help people stick with STEM paths and do well.

3. Expectancy-Value Theory can help us understand the results of this study. This theory says that students' motivation is mostly based on how likely they think they are to succeed and how much they value a task. The Grade 10 students elevated self-efficacy indicates a strong expectancy component, as they possess confidence in their capacity to excel in STEM disciplines. This confidence makes them more likely to want to do hard schoolwork, like ICT courses, and it helps them stick with it when things go tough. Because of this, pupils are more likely to tackle difficult problems and do better in school. Also, when students believe they can do something, they are more likely to see STEM paths as possible and worth pursuing, which makes them more interested in STEM-related occupations. So, helping students believe in themselves is very important for boosting their motivation and is in line with Expectancy-Value Theory, which says that this will lead to long-term engagement and success in STEM education.
4. The finding that sex does not significantly influence students' interest or self-efficacy in STEM can be understood through both Self-Efficacy Theory and Expectancy-Value Theory, which emphasize that motivation is shaped more by individual beliefs than by demographic factors. According to Self-Efficacy Theory, students' confidence in their ability to perform STEM-related tasks develops from personal experiences, social support, and mastery rather than from their sex. Similarly, Expectancy-Value Theory suggests that students' motivation is driven by their expectancy for success and the value they assign to a subject, not by gender-based differences. The absence of significant differences implies that both male and female students possess comparable levels of confidence and interest in STEM, enabling them to engage equally in challenging academic tasks. These finding highlights that fostering positive learning experiences and strengthening self-efficacy beliefs are more critical in promoting STEM participation than focusing on sex-based distinctions, ultimately supporting equal opportunities for all students to pursue STEM pathways and careers.
5. Enrolment in ICT subjects does not produce significant differences in overall interest of grade 10 students in pursuing STEM strand. This finding can be interpreted through Expectancy-Value Theory, which posits that students' engagement is driven by their expectations of success and the value they assign to the task. ICT experiences may increase the perceived utility and relevance of STEM, enhancing both interest and confidence.
6. No significant difference existed between the level of self-efficacy of the grade 10 students with and without ICT subjects in their curriculum in pursuing STEM strand in the senior high school level. This indicates that whether ICT is integrated in their curriculum or not does not result to a difference in their self-efficacy level. So, the presence or absence of ICT subject in the grade 10 curriculum cannot be associated with their level of self-efficacy in pursuing STEM strand in the senior high school level.
7. The positive correlation between interest and self-efficacy among students with ICT subjects suggested that practical exposure to technology enhances students' confidence in STEM-related tasks. In line with Bandura's theory, mastery experiences—such as successfully completing ICT tasks—were

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critical sources of self-efficacy, thereby boosting students' motivation and persistence in STEM-related activities.

8. Overall, these findings indicated that programs designed to increase STEM awareness and provide hands-on experiences, particularly those integrating ICT, can strengthen students' engagement, confidence, and readiness for STEM tracks in senior high school. By addressing both the expectancy (belief in success) and value (importance and utility) components highlighted in Expectancy-Value Theory, educators can effectively cultivate sustained interest and self-efficacy in STEM disciplines.

Recommendations

In the light of the conclusions drawn from the study, the following are hereby recommended:

1. **Integrate ICT Courses Early in the Curriculum**
   Schools are encouraged to integrate basic ICT subjects earlier in the junior high school curriculum to provide students with foundational technological skills that may enhance their interest and confidence in STEM-related learning.
2. **Develop a STEM Readiness Program**
   Schools may implement programs that build both interest and confidence in STEM. Such programs could include hands-on activities, coding clubs, robotics workshops, or STEM challenges, which allow students to apply ICT and scientific concepts in real-world contexts.
3. **Teacher Training on Technology Integration**
   Educators should be provided with professional development opportunities to effectively integrate ICT into STEM instruction. Training in digital tools, programming platforms, and interactive simulations can help teachers support students' self-efficacy and maintain engagement.
4. **Peer Mentoring and ICT Support Groups**
   Schools can establish peer mentoring programs where students with stronger ICT skills assist those with less exposure. Collaborative learning may enhance self-confidence, reduce anxiety around technology-based tasks, and increase students' motivation to pursue STEM courses.
5. **Curriculum Alignment with MATATAG Standards**
   The Department of Education's MATATAG Curriculum should guide the integration of ICT into STEM-related subjects in line with the findings of this study. This may be achieved by aligning lesson plans and competencies so that ICT skills are embedded within STEM instruction, such as through digital simulations, data analysis, coding, and other problem-solving activities. Schools should also review and enhance their curricula and provide teacher training to ensure effective and consistent integration of ICT across STEM subjects. In addition, this study may serve as a useful reference for future research and for the implementation of new ICT-related programs in STEM education, helping guide planning, decision-making, and evaluation. These efforts can help bridge gaps between students' interest, self-efficacy, and technical skills, thereby strengthening their readiness for STEM pathways and careers.
6. **Parental Engagement and Awareness**
   Encouraging parents to support ICT-related learning at home may strengthen students' self-efficacy and interest in STEM. Schools can organize workshops,

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informational sessions, or resource guides to help parents understand the importance of early exposure to technology and STEM pathways.

7. **Continuous Assessment and Feedback**
   Schools should implement regular assessments to monitor students' progress in ICT and STEM-related competencies. Providing timely feedback can help students recognize improvements in their skills and maintain motivation and confidence.
8. **Future Research Studies**
   Researchers are encouraged to conduct longitudinal studies to examine how ICT subjects in junior high school impacts students' STEM performance and career choices over time. Such studies can guide policymakers and educators in making evidence-based decisions about ICT integration.

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