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Enrollment Trend of the Bachelor of Science in Electronics Engineering

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Abstract — Despite the growing global and national demand for electronics engineers, enrollment in the Bachelor of Science in Electronics Engineering (BSECE) program in the Philippines continues to decline. While previous studies have explored general trends in student enrollment, limited attention has been given to the specific factors influencing students' interest in pursuing BSECE. This study aims to identify the key influences on senior high school students' decisions to enroll in the BSECE program at Northwest Samar State University (NwSSU) in Calbayog City, Western Samar. A descriptive survey method was employed, using purposive sampling to select participating schools and stratified random sampling to identify student respondents. The results show that students' knowledge of the BSECE program had the strongest influence on their enrollment intentions, followed by career guidance, personal interest, and socio-cultural factors. A clear understanding of the curriculum and career prospects significantly shaped students' decisions. Although career guidance contributed to these decisions, access to in-depth counseling, mentorship, and industry exposure was found to be limited. Personal interest, particularly in technical and hands-on learning, played a role but did not always align with specific career goals in electronics engineering. Socio-cultural factors, such as family finances and local job opportunities, had a lesser but still relevant impact. The findings highlight the importance of improving students' awareness of BSECE and its real-world applications to attract more enrollees. The study recommends enhancing career mentorship programs, integrating industry-linked learning experiences, and providing financial support initiatives to encourage informed decision-making. These strategies could help increase student interest and enrollment in the BSECE program at NwSSU and serve as a model for other institutions facing similar challenges.

Keywords — Electronics Engineering, Enrollment, Personal factor, Career Guidance, Socio-cultural factor

I. Introduction

The demand for electronics engineers remains strong globally. In the United Kingdom, for instance, the manufacturing sector continues to seek qualified engineering graduates. A report by Make UK (2018) revealed that 63% of manufacturers had recruited engineering graduates within the previous three years, with 66% planning to do so in the following three years. This indicates a sustained global need for skilled electronics engineers and underscores the career opportunities

available to Bachelor of Science in Electronics Engineering (BSECE) graduates (makeuk.org, 2018).

The BSECE program in the Philippines plays a vital role in supplying skilled professionals to the country's expanding technology sector. The program equips students with expertise in designing, developing, and maintaining advanced electronic systems, integrating fields such as computer science, physics, and communication theory (CHED, 2017). Graduates secure employment in various industries, including electronics manufacturing, telecommunications, broadcasting, data communications, and ICT-related fields. The influx of foreign investments, particularly in Philippine Economic Zones in Laguna and Cavite, has further driven demand for electronics engineers (Loquias, 2015). According to the Philippine Statistics Authority (PSA), the electronics industry significantly contributes to the nation's GDP, reflecting its economic importance (EEI, 2024).

Despite these promising career prospects, the Philippines has experienced a troubling decline in BSECE enrollment. Data from the Commission on Higher Education (CHED) indicates that enrollment in engineering and technology programs dropped significantly by 15.3% from Academic Year (AY) 2015-2016 to AY 2017-2018 (Rani et al., 2020). This downward trend has been observed across multiple universities nationwide. For example, in Region 2 (Cagayan Valley), the number of engineering students declined by 2.38% between AY 2014-2015 and AY 2015-2016 (Danga, 2016). Similarly, De La Salle University reported a sharp drop in first-year BSECE enrollment, from 206 students in AY 2013-2014 to just 13 in AY 2017-2018 (De La Salle University Manila, 2022).

Research has explored factors influencing student enrollment trends; however, gaps remain in understanding the decline in BSECE programs. Studies such as Pawar (2020) examined enrollment trends at the University of Michigan-Dearborn, identifying socioeconomic and demographic factors, including household income, educational background, and internet access, as key influences on students' course selection. Nevertheless, there is limited research specifically addressing BSECE enrollment trends in the Philippine context. Another notable gap is the gender disparity in BSECE enrollment. Beltran et al. (2024) found that male students constituted 70%-72% of enrollees, while female students accounted for only 28%-30%, suggesting that societal perceptions and gender-related influences may discourage female participation (Beltran & Arboleda, 2024). Further research is necessary to explore the barriers preventing female students from pursuing BSECE and potential interventions to address gender imbalances.

Northwest Samar State University (NwSSU) has also experienced a decline in BSECE enrollment. According to the Office of Student Affairs and Services (SAS), the number of students selecting BSECE as their first-choice program dropped from 12 in AY 2021-2022 to 8 in AY 2023-2024, and further declined to just 3 in AY 2024-2025. Comprehending the fundamental factors contributing to this decline is paramount for developing strategies to strengthen enrollment and

ensure a steady supply of skilled electronics engineers to support the country's growing technology sector.

Given these research gaps, this study aims to provide data-driven recommendations to improve student awareness, career guidance, and institutional support for the BSECE program. The findings will benefit multiple stakeholders, including the university administration, senior high school students, the electronics industry, the community, and future researchers. This study specifically aims to provide NwSSU administrators with an understanding of the factors behind the decreasing BSECE enrollment is the goal of this study. This understanding will empower them to engage in strategic planning, implement targeted solutions, develop the curriculum, and create outreach initiatives to increase student enrollment and revitalize the program. Furthermore, this research will benefit senior high schools by facilitating the development of educational resources and outreach initiatives designed to enhance awareness of the BSECE program, thereby empowering students to make well-considered career choices founded on a more comprehensive understanding of the curriculum, prospective career paths, and industry requirements. Additionally, the electronics industry will benefit from this study by identifying factors affecting BSECE enrollment and bridging the gap between industry needs and academic institutions to ensure a steady supply of skilled professionals. The community will also gain from the study's efforts to address enrollment decline and foster interest in electronics engineering as a viable and rewarding career path. Lastly, researchers can use the findings as a foundation for future studies on declining engineering enrollment and contribute to discussions on improving student retention in STEM fields.

The study pinpointed what influenced senior high school students to choose a BSECE degree at NwSSU. It examined students' profiles and categorized influencing factors into four key areas: personal characteristics, course knowledge, career guidance, and socio-cultural effects. The study proposed measures to improve BSECE enrollment based on these findings.

Data were collected from senior high school students (Grades 11 and 12) enrolled in selected public senior high schools in Calbayog City. The study examined the influence of variables such as sex, year level, academic strand, and current grade point average (GPA) on students' enrollment decisions. Additionally, it assessed the impact of awareness of the BSECE program, the quality of career guidance, and social factors like family and norms played a role. However, it included only public senior high schools in Calbayog City, which may not have fully reflected the factors influencing students from other regions with different socio-cultural and educational backgrounds. It also excluded out-of-school youth, students from technical-vocational institutions, and private school students, thereby narrowing the range of perspectives considered. Furthermore, since data collection was limited to a single academic year, the study may not have captured long-term enrollment trends influenced by changes in educational policies, labor market fluctuations, or evolving societal attitudes toward engineering disciplines.

Addressing these lacunae in existing research, this study sought to develop targeted interventions to revitalize BSECE enrollment and ensure the program continues to produce highly skilled electronics engineers who can meet the demands of both local and global technology industries.

Literature Review

This study drew upon a thorough review of pertinent published and unpublished literature, both local and international, to provide a strong foundation for the investigation. It included academic journals, conference proceedings, books, and other credible sources that addressed topics related to the enrollment trend of the Bachelor of Science in Electronics Engineering (BSECE).

Conceptual Literature. Choosing a career is a complicated process, involving psychological, social, and economic influences. Several theories explain how individuals make career choices and what affects those decisions. This section covers important theories of career decision-making, looking at psychological, social, and economic viewpoints.

A cornerstone of career development theory is John L. Holland's "Person-Environment Fit Theory," as cited by De Cooman et. al. (2022) which posits that individuals gravitate towards careers that are congruent with their personality profiles. Holland categorized career preferences into six types—Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (RIASEC)—and proposed that career satisfaction arises when a person's traits match their work environment (De Cooman & Vleugels, 2022). Similarly, Frank Parsons' Trait and Factor Theory emphasized the alignment between an individual's abilities, interests, and personality with a suitable career path, arguing that a good fit leads to higher job performance and satisfaction (Naim, 2015).

Armitage and Nassor Amar (2021), in their work, "Person-Environment Fit Theory: Application to the Design of Work Environments," highlighted the significance of person-environment (P-E) fit in organizational success. Recognizing the diverse nature of individual personalities, they emphasized that high-performing organizations cultivate workplaces that enhance positive psychological aspects, including behavioral traits, physical needs, and social well-being. Consequently, organizations increasingly utilize P-E fit theory to design work environments that harmonize individual psychological needs with collective performance goals, aiming to boost workforce productivity. This evolution is evident in the transformation of workplace designs from the cubicle-centric 1960s to open-plan layouts and, more recently, to activity-based flexible spaces integrating physical and digital environments (Armitage & Amar, 2021).

A further theoretical lens is offered by Ajzen's Theory of Planned Behavior, which proposes that career decision-making in individuals is predicated upon their attitudes, the perceived subjective norms, and their sense of behavioral control (Bardus, 2012). This theory suggests that career intentions depend on beliefs about the expected outcomes of a career choice

and the level of control an individual perceives over their decision-making process (Ajzen, 2019). Eccles and Wigfield's Expectancy-Value Theory offers a congruent perspective, positing that individuals' career decisions are shaped by their anticipated success in a given domain and the perceived value they associate with that domain (Kenneth Jones & Hite, 2020). Their research highlighted how psychological, social, and cultural influences shape students' aspirations and persistence in a chosen career path (Tonks & Klauda, 2017).

The "Challenges, Difficulties, and Barriers for Engineering Higher Education" by Miguel Valero (2022) examined the pressures and barriers that engineering education faces in adapting to modern demands. One of the key issues highlighted is the need for reforms that improve the employability of engineering graduates, particularly through competency-based and active learning approaches. However, despite the urgency of these changes, many institutions struggle to implement reforms due to resistance to change, rigid organizational structures, and a lack of understanding of new educational techniques (Valero, 2022).

Moreover, education plays a vital role in shaping career aspirations. Paulo Freire's Critical Pedagogy Framework emphasized the role of education in empowering students to make informed career choices by challenging existing power structures and fostering critical thinking (Luitel et al., 2022). Additionally, Sandra Bem's Gender Schema Theory explained how societal gender norms influence career preferences, with individuals categorizing career options based on learned gender roles from an early age.

The work of Donald Super on the influence of career guidance programs on student career decisions offered relevant insights for our research (Mutiara & Astuti, 2022). His theory emphasized that career development is an ongoing process influenced by various factors, including exposure to different career options and stages of career development (Career Research, 2017).

Finally, the Diffusion of Innovations Theory, as proposed by Everett Rogers, provides a framework for understanding the propagation of new ideas and career trends within a community, consequently influencing individuals' awareness and perceptions of emerging professional avenues (Halton, 2023). This theory highlights the importance of communication and social influence in shaping career decisions, particularly in fields driven by technological advancements (Weil, 2018).

Research Literature. The section reviews the existing literature relevant to the factors impacting the enrollment trend of BSECE, providing a critical overview of key studies that inform the present investigation.

The study on enrollment patterns at San Sebastian College-Recoletos de Cavite (SSC-RdC) from 2014 to 2023 (Ditucalan, 2024) aligned with the current study on enrollment trends in the Bachelor of Science in Electronics Engineering (BSECE) program by emphasizing the importance of understanding enrollment dynamics to inform strategic decision-making in higher education. Both studies recognized that enrollment trends are influenced by multiple factors, including

program popularity, job market demand, and institutional strategies. The SSC-RdC study highlighted fluctuations in student interest across different programs, including BS Electronics Engineering, which directly connects to the current research's objective of identifying factors influencing students' decisions to pursue or not pursue BSECE. Moreover, the quantitative methodology used in the SSC-RdC study, which analyzed official enrollment records, aligned with the data-driven approach of the current study. While the SSC-RdC research provided a broad institutional perspective on enrollment shifts across multiple programs, the current study narrowed its focus to one specific program (BSECE) and its influencing factors—such as personal motivations, knowledge of the course, career guidance, and socio-cultural aspects. Another key parallel between the two studies is their emphasis on strategic interventions to address enrollment challenges. The SSC-RdC study recommended targeted marketing, resource allocation, and program adjustments to sustain long-term growth. Similarly, the current study sought to propose intervention strategies to increase BSECE enrollment, ensuring the program remains competitive and attractive to students. By integrating insights from the SSC-RdC study, the current research benefited from broader enrollment trends and strategic planning frameworks, providing a stronger foundation for recommendations to enhance BSECE enrollment at Northwest Samar State University.

Rosario G. Danga's (2016) study on "Enrollment and Graduates Trends in Higher Education in Region 2" provided valuable insights into the broader context of higher education trends in Region 2, which encompasses various provinces in the Philippines (Danga, 2016). While Danga's research may not directly focus on the awareness of specific academic programs like the BSECE at NwSSU, it offered a foundational understanding of enrollment patterns and educational preferences within the region. Danga's study examined factors influencing enrollment trends, including demographics, economic conditions, and educational opportunities within Region 2. While Danga's study may not directly address the enrollment trend of specific academic programs like the Electronics Engineering Program at NwSSU, it offered valuable context and insights into enrollment and graduation trends within Region 2. By combining Danga's findings with the current study's emphasis on program awareness and student preferences, the researcher developed a deeper understanding of the educational environment and prospects for strategic intervention and development.

Aishwary Pawar's 2020 study titled "College Enrollment Trends and Pattern Evaluation: A Data Analytics Investigation" offered valuable insights that can be connected to the current research on factors influencing enrollment in the BSECE program. Pawar's study employed data analytics techniques to examine college enrollment trends (Pawar, 2020). His research only looked at social, economic, and population-related factors to explain why enrollment changed at the University of Michigan-Dearborn. By analyzing data through QGIS maps, the researcher identified how various demographic characteristics across Michigan impacted student admissions. The analysis revealed that admitted students came from communities with diverse educational backgrounds, median household incomes, and internet access levels. These variables collectively

delineate the socioeconomic stratum, community attributes, and lifestyles characteristic of the admitted student population. Notably, the analysis pinpointed specific demographic attributes that seem to influence enrollment decisions. These key factors include minority population within a zip code, number of households with internet access, travel distance to the university, number of high school graduates and above in the area, total population of the zip code, and number of college-eligible individuals (aged 18-24). Similar to Pawar's study, the current study aimed to investigate the factors influence enrollment trend in BSECE program.

The study titled "Factors Influencing Students in Choosing their College Course" (B. et al., 2016) provided valuable insights relevant to the current research investigating the factors affecting enrollment in the BSECE program at NwSSU. The study identified personal preference and interest as important variables influencing students' course selection. Understanding SHS students' current interests may have been significant in the context of this investigation. If the BSECE program aligns with their natural inclinations towards STEM fields, increased awareness can further solidify their interest and potentially encourage enrollment. Parental influence is another significant factor identified by (Joaquin et al., 2016). By raising awareness among parents about the BSECE program, its career opportunities, and potential benefits, the study can indirectly influence students' decisions through increased parental support and encouragement. While the study found peer influence to be less significant than other factors, it still merits consideration. By increasing awareness of the BSECE program among a wider group of SHS students and facilitating positive discussions about its potential, the study can potentially create a peer environment that supports and encourages enrollment in the program. The study revealed that students might be unaware of various course options available to them. This is consistent with the present study's emphasis on raising awareness of the BSECE program as a potential strategy to counteract the decline in enrollment.

The study titled "Factors Affecting Grade 10 Students in Choosing Their Preferred Tracks for Senior High School" by Divino (2016) investigates the factors influencing Grade 10 students' choices regarding senior high school tracks. It identifies various factors beyond academic performance, such as parental influence, peer influence, and personal interests. While this study focuses on track selection, it highlights the importance of considering diverse factors influencing student choices, which might also be relevant to their program selection at the tertiary level.

The related study on course preference and career decision-making among college entrants (Ann et al., 2021) aligned closely with the current study on factors influencing enrollment in the Bachelor of Science in Electronics Engineering (BSECE) program. Both investigations underscored the significance of a range of factors in influencing students' decisions regarding the selection of a college course, with particular emphasis on career opportunities, personal interest, and the demands of the industry. The linked study discovered that career prospects have a significant impact on students' course choices, which is consistent with the current study's investigation of how job availability, wage potential, and industry demand influence BSECE

enrollment trends. Additionally, personal interest and passion were identified as key elements in course selection, reinforcing the current study's focus on personal motivation and the alignment of skills with the BSECE program. Furthermore, the importance of career guidance and advocacy initiatives in supporting students' career decision-making processes is emphasized in both studies**.** The previous study recommends career programs, orientations, and advocacy efforts to help students make informed choices, which is also explored in the current study's investigation of career counseling and information dissemination on BSECE enrollment. Furthermore, the related study acknowledges concerns about degrees becoming irrelevant to industry demands, reinforcing the importance of examining enrollment trends in engineering programs like BSECE, which is a highly technical and industry-driven field.

The study by Olivia P. Almario on the "Factors affecting the career choice decisions of Senior High School (SHS) students in Central Luzon" aligned closely with the current study on factors influencing enrollment in the BSECE program. Both studies highlighted the crucial role played by socio-economic backgrounds, individual characteristics, and academic performance in guiding students' choices about their education and future careers. Almario's study highlighted social, economic, and environmental factors, which are also central to the current study's exploration of socio-cultural factors, financial considerations, and career opportunities affecting BSECE enrollment (Almario, 2021). Furthermore, Almario's study examined students' personal and academic abilities as key determinants of career choices, reinforcing the current study's focus on how individual interests, skills, and prior academic preparation influence the decision to enroll in BSECE. Both studies highlighted the importance of career planning in today's fast changing labor market, where students must deliberately choose courses to ensure career stability and financial success. Additionally, Almario's findings on the complexities brought by technological advancements in career choices are particularly relevant to BSECE, a field deeply rooted in technology and innovation.

Magpulong et al.'s (2023) study, "Factors influencing the course preferences of Senior High School students as a basis for career guidance," exhibited a strong correlation with the current research focused on enrollment trends in the BSECE program. A key similarity lies in the emphasis placed by both studies on the importance of personal interest, family influence, and external support systems in the formation of students' academic and professional decisions. The findings of the study by Magpulong et al. emphasized the significance of career guidance programs, highlighting how students benefit from structured counseling, parental involvement, and institutional support in making informed decisions (Magpulong et al., 2023). Similarly, the current study investigated the factors influencing Senior High School students' decisions to pursue or not pursue BSECE, which can provide insights into how career guidance efforts can be improved to encourage more students to consider the program. Moreover, the study recommends strengthening career guidance initiatives, training counselors, and collaborating with various stakeholders such as employment service offices and professionals. These suggestions are in alignment with the

current investigation's aim of pinpointing effective strategies to increase enrollment in the BSECE program**.**

II. Methodology

This study used a descriptive survey design to investigate enrollment trends and decision-making factors influencing senior high school students' interest in the Bachelor of Science in Electronics Engineering (BSECE) program at NwSSU. The research focused on Grade 11 and 12 students from selected public senior high schools in Calbayog City, covering all academic strands.

Purposive sampling was applied to select relevant schools based on accessibility and academic program diversity. Within these schools, stratified random sampling was used to ensure proportional representation across academic strands (STEM, ABM, HUMSS, GAS, and TVL).

A researcher-developed questionnaire collected data on demographics (sex, year level, strand, GPA) and examined factors such as personal motivations, course awareness, career guidance availability, and socio-cultural influences affecting enrollment in the BSECE program.

Descriptive statistics, including frequency, percentage, mean, and standard deviation, were employed to summarize the data and interpret patterns in students' responses.

Appropriate ethical protocols were followed to maintain the legitimacy and reliability of the findings.

To ensure the reliability of the study's findings, a minimum sample size of 355 respondents was targeted, as determined through the application of Slovin's formula. This sample size was calculated based on a total population of 3,182 students and an acceptable margin of error of 5%.

III. Results and Discussion

In terms of sex, the majority of the respondents were female, with 231 out of 355 students (65.1%), while male respondents accounted for only 124 (34.9%). Regarding grade level, 215 respondents (60.6%) were in Grade 12, while 140 (39.4%) were in Grade 11. This shows that more senior high school students in their final year participated in the study, possibly because they are closer to making career and college-related decisions compared to their Grade 11 counterparts.

When it comes to academic strand, the largest portion of respondents belonged to the Science, Technology, Engineering, and Mathematics (STEM) strand, with 178 students (50.1%). This is followed by Humanities and Social Sciences (HUMSS) with 93 students (26.2%), General Academic Strand (GAS) with 65 students (18.3%), and Accountancy, Business, and Management (ABM) with only 19 students (5.4%). The high percentage of STEM students suggests a strong

inclination towards science and technology-related fields among the respondents, which may influence their perspectives on engineering programs.

In terms of academic performance, the majority of the respondents (279 or 78.6%) had a GPA of 90 and above which means that most of them are high-achieving students. Meanwhile, 51 students (14.4%) had a GPA between 85-89, 24 students (6.8%) had a GPA ranging from 80-84, and only one student (0.3%) had a GPA between 75-79. Notably, none of the respondents had a GPA below 75. This data suggests that the surveyed students generally perform well academically which could influence their career choices and confidence in pursuing more challenging courses like electronics engineering.

Factors Influencing the Enrolment in Bachelor of Science in Electronics Engineering Program

This section shows the mean and standard deviation of the factors influencing the enrollment in Bachelor of Science in Electronics Engineering in terms of personal factors, knowledge of the course, provision of career guidance, and socio-cultural factors.

Table 1. Factors Influencing the Enrollment in Bachelor of Science in Electronics Engineering Program

Factors	$\bar{x}$	sd	Desc.
Personal Factor	2.84	0.324	N
Knowledge of the Course	3.10	0.239	N
Provision of Career Guidance	2.86	0.204	N
Socio-cultural factor	2.73	0.186	N

Table 1 shows the summary of the factors influencing enrollment in BSECE program. Data shows that the enrollment in the program is influenced by knowledge of the course, career guidance, personal interest, and socio-cultural factors. Understanding the curriculum and career opportunities plays the most significant role, as students with better awareness are more likely to pursue the program. Career guidance also impacts decisions, but many students have limited access to structured counseling, mentorship, and industry exposure. Personal factors, such as interest in hands-on technical work, contribute to enrollment, but career alignment with BSECE remains uncertain for many. Socio-cultural factors, including family expectations and peer influence, have a lesser impact, though financial constraints and job market prospects play a role. Strengthening career mentorship, industry-linked learning, and financial support initiatives could enhance student interest and enrollment in the BSECE program.

IV. Conclusion

The findings of the study reveal that students' interest in the Bachelor of Science in Electronics Engineering (BSECE) program is strongly influenced by their academic background, particularly those in the STEM strand who show a greater inclination toward engineering-related fields. However, there is a clear need to raise awareness and motivation among students from other academic strands through targeted career guidance, industry exposure, and mentorship. Many students are drawn to the BSECE program due to its hands-on learning experiences and perceived societal impact, yet there are evident gaps in early career aspirations and specific motivations for pursuing electronics engineering. This suggests the importance of helping students better align their academic choices with their long-term career goals.

Despite recognizing the potential career and financial benefits of a BSECE degree, many students lack a thorough understanding of the program's curriculum, real-world applications, and how it fits with their personal interests. Therefore, initiatives to improve students' knowledge of the course content and its relevance to their future careers are essential. Additionally, while students are somewhat aware of the career opportunities within electronics engineering, access to structured career guidance—such as workshops, career fairs, and mentorship opportunities—is limited. Enhancing these efforts would not only improve enrollment but also support students in making more informed academic and career decisions.

Finally, socio-cultural factors such as media representation and job availability influence students' decisions more than familial or peer pressure. This suggests that institutions should focus on promoting regional career prospects in electronics engineering and work to elevate the field's prestige through strategic media and public engagement. These efforts can collectively strengthen interest in the BSECE program and encourage more students to pursue it as a viable career path.

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