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Mapping career trajectories: An analysis of employment outcomes among Bachelor of Science in Electronics Technology graduates at the University of Science and Technology of Southern Philippines

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Abstract
This study investigated the significant differences in professional competencies, work ethics, and job placements among graduate batch groups of the BS Electronics Technology, University of Science and Technology of Southern Philippines. Using statistical tests, including Chi-Square and Kruskal-Wallis analysis, the study examines respondents' ratings on various skill sets, work ethics parameters, and job descriptions. The results revealed that the null hypothesis of no difference was rejected for most parameters, indicating statistically significant variations in interpersonal skills, mathematical skills, character, communication, and other core competencies across batches. Notably, the Chi-Square test showed a significant association between batch groups and the Instrumentation Technician job description (p=.001), highlighting differential employment outcomes in this role. Consistently high mean ratings above 4.0 across most work ethics and graduate attributes parameters, many with zero standard deviations, demonstrate a strong, uniform perception of positive professional qualities among graduates. An outlier was observed in innovative thinking skills, with a lower mean rating of 3.67, suggesting areas for growth. The findings underscore the dynamic development of graduate competencies and the relevance of tailored academic and workplace interventions. These alternatives emphasize the need to focus on both strengths and specific areas, such as innovation to enhance graduate readiness and employability. The study contributes important insights into graduate performance variation and the factors influencing employment trajectories in diverse industrial settings.

Keywords: Career trajectories, chi-square test, graduate attributes, Kruskal-Wallis test, work ethics

Introduction

The Higher Education Act of the Philippines mandates that higher education institutions provide quality and relevant education accessible to everyone (Chao, 2021) [5]. This ensures that graduates, especially in science and technology, possess the skills and knowledge necessary to support national development goals and meet global industry standards, resulting in capable and competitive professionals who can make a positive contribution to society (Ahmad, Isa, Liaw, Nazari, Abdullah, Rani & Lokman, 2023) [3]. There is widespread recognition that equitable access to education is a key factor in fostering economic competitiveness in today's knowledge-based global economy, highlighting the importance of providing high-quality, inclusive education (Jemeli, & Fakandu, 2019; Chukwuma & Ibe, 2024) [6, 15]. Similar efforts have been made to address cultural and socio-political challenges that are vital for ensuring education is both inclusive and fair. These initiatives aim to remove barriers related to social diversity, political environments, and cultural differences, thereby creating an educational setting where all individuals, regardless of background, have fair access to quality learning opportunities (Qureshi, Malkani, & Rose, 2020) [21]. Addressing these issues is crucial to achieving the broader goal of providing education that serves a diverse population and advances social justice. Indeed, higher education plays a vital role in a nation's growth and development across social, economic, cultural, scientific, and political sectors (Kumar, Shukla, & Passey, 2020) [17]. As a result, graduates and professionals are expected to demonstrate high competence and to gain recognition internationally, guided by a global competency framework applicable across different jobs, industries, and regions (Strong, Burkholder, Solberg, Stellmack, Presson, & Seitz, 2020) [25]. Higher education institutions (HEIs) and their programs must aim for excellence aligned with international standards. Implementing Outcome-Based Education (OBE) in engineering is critical to ensure programs produce the desired learning outcomes that students need for professional success (Syeed, Shihavuddin, Uddin, Hasan, & Khan, 2022) [27]. To support this mandate, the Commission on Higher Education (CHED) encourages HEIs to pursue voluntary accreditation through self-regulation and peer evaluation by offering incentives and greater autonomy. As a result, accreditation is now a key mechanism for promoting educational excellence (Dotong, & Laguador, 2015) [12]. This process involves evaluating and improving the quality of institutions and programs through self-assessment and peer review, based on standards established by internationally recognized accreditation bodies (Makhoul, 2019) [18]. Ensuring education meets these minimum standards is essential to address the evolving global demands and fully realize the benefits of education (Kumar, Shukla, & Passey, 2020) [17]. Accreditation provides official recognition, funding, and validation of educational quality from accrediting agencies (Conchada & Tiongco, 2015) [7]. In response, the University of Science and Technology of Southern Philippines (USTP) is dedicated to fulfilling its higher education mandate by aligning its programs with national and global economic

developments, using its autonomy to develop curricula that reflect current industry trends.

The electronics industry in the Philippines, a key part of the manufacturing and technology sectors, shows strong demand for graduates with a Bachelor of Science in Electronics Technology to meet the changing workforce needs in the era of Industry 4.0. This sector benefits from a young, adaptable workforce and places increasing importance on skills in advanced automation, AI integration, machine operations, digital technologies, and other Industry 4.0 enabling technologies that lead to Industry 5.0 (Raja Santhi, & Muthuswamy, 2023) [22]. Electronics technology graduates are essential for filling roles in automated production lines, IoT device development, embedded systems, and smart manufacturing processes (Hernandez-de-Menendez, Escobar Díaz, & Morales-Menendez, 2020) [14].

Industry 4.0 demands professionals who possess not only technical expertise in electronics but also competencies in digital skills, problem-solving, and adaptability to rapid technological changes (Kipper, Iepsen, Dal Forno, Frozza, Furstenau, Agnes, & Cossul, 2021) [16]. As the Philippines advances its manufacturing capabilities with AI, robotics, and smart technologies, the need for electronics technologists who can maintain, program, and innovate smart devices and systems in various industries, including consumer electronics, telecommunications, and industrial automation, is increasing sharply. The Electronics Technology program is motivated to engage with industry and the business world to strengthen universities' role in supporting and contributing to innovation, and managing uncertainty and complexity (Bui, 2019) [4]. The graduates help in bridging the gap between traditional manufacturing roles and the digital transformation of industries, positioning them as critical contributors to national economic growth and global competitiveness.

The Electronics Technology program currently uses an outcomes-based education (OBE) curriculum, which defines graduate attributes through program educational objectives (PEOs) and program outcomes (POs). Program Outcomes (POs) define the skills and competencies graduates should have upon graduation, but the validation of Program Educational Objectives (PEOs), which measure graduates' achievements three to five years after completing the program, has not yet been conducted, raising concerns about the relevance and effectiveness of these outcomes in relation to industry needs. Validation is a systematic process of collecting credible evidence to evaluate the accuracy and appropriateness of interpretations and decisions based on assessment results (Shaheen, Shaheen, Ramadan, Hefnawy, Ramadan, Ibrahim, & Flouty, 2023) [24]. This process is essential to ensure that the program's educational objectives stay relevant and effective in preparing graduates for their professional roles beyond graduation (Cook, & Hatala, 2016) [8]. Developing procedures for continuous quality improvement (CQI) in a program is vital for monitoring student learning, maintaining progress, and achieving institutional goals through periodic review of program educational objectives (PEOs) (Mappatao, 2018) [19]. Conducting a graduate tracer study is crucial for verifying whether the PEOs and POs are being achieved in practice. These studies provide valuable data on graduate employment and performance, offering insights into the relevance and quality of university programs, as well as their alignment with labor market demands (Cuadra, Aure, & Gonzaga, 2019) [10]. This evaluation supports continuous improvement of educational programs to better prepare graduates for their careers. A graduate tracer study offers valuable insights into graduates' employment status and experiences, including their job profiles, the relevance of their educational background, and their satisfaction with academic preparation during their academic engagement (Vong, 2015) [28]. It gathers critical data on curriculum relevance and helps confirm that educational programs are designed based on agreed-upon learning outcomes developed collaboratively by higher education institutions, employers, and stakeholders. This collaboration supports practical training opportunities such as internships and career guidance (Costin, & Claudia, 2015) [9]. Furthermore, tracer studies help assess the effectiveness of institutional services, study conditions, and social responsibility efforts, ultimately measuring graduates' quality and students' satisfaction with their higher education experience (Cuadra, Aure, & Gonzaga, 2019) [10]; Santos, Marques, Justino, & Mendes, 2020) [23].

Therefore, the tracer study can demonstrate the achievement of the agreed program outcomes that graduates might recognize through their occupational status. As a result, graduate and employer surveys are a form of empirical research that can offer valuable insights for assessing the results of education and training at a particular higher education institution (Suleman, 2018) [26]. These studies can gather data on the employment status of recent graduates, serving as indicators of their professional performance. The initial research can also serve as a foundation for the ongoing development of the existing program within a quality assurance framework.

Since the study aims to gather insights from stakeholders on potential improvements to academic programs, it is important to note that its purpose determines the standards for assessing a program's value through the corresponding program outcomes (PO) and program educational objectives (PEOs) (Premalatha, 2019) [20]. To achieve this, it is essential to evaluate how effectively academic institutions prepare graduates for their careers and how well these institutions develop key graduate attributes necessary for professional success. It is also important to consider significant and constructive industry feedback and to identify the training needs of university faculty members to attain the desired quality amidst technological advancements (Abouelenein, 2016) [2]. These concepts emphasize the importance of outcomes-based education (OBE), where each program must develop its program educational objectives (PEOs) within a specific time after graduation, in addition to the immediate program outcomes. OBE is implemented through competency-based learning standards and outcomes-based quality assurance, as outlined in the Commission on Higher Education (CHED) Memorandum Order (CMO) No. 46, s. 2012 (De Guzman, Edaño, & Umayan, 2017) [11]. Similarly, the curriculum and instruction accreditation area instrument of the Accrediting Agency of Chartered Colleges and Universities of the Philippines (AACCUP) is designed to ensure that the core content of programs is effectively delivered, as measured by

student performance both academically and in occupational placement areas (AACCUP, 2015) [1]. Accreditation focuses on quality assurance and continuous quality improvement (Gaston, 2023) [13]

Since mapping career trajectories provides valuable information on graduates' employability and professional performance in the workplace, it is crucial for quality assurance purposes that this empirical data becomes key for program assessment and review, helping to make the curriculum more aligned with current industry needs. As a result, effective program and graduate evaluation require collaboration between academia and industry, fostering a productive partnership that supports and improves curricular programs. Therefore, the study aimed to address the following issues:

1. Demographic information BSEcT graduates
2. Industry placement
3. Job description
4. Salary range
5. Graduate attributes utility
6. Work Ethics

Objectives of the Study

The general objective of the study is to assess the viability of the BS in Electronics Technology (BSEcT) program in terms of its graduates' employability and relevance to the industry. Specifically, the study has the following aims:

1. To undertake an analysis of graduates' occupational placement in the industry, per their industry workplace, job assignment, salary range, and work ethics.
2. To evaluate the graduates' perception of their USTP graduate attributes, program outcomes relevance, and academic skill set utility in the industry.

Methodology

The study used a descriptive research design to examine the employability and academic relevance of Bachelor of Science in Electronics Technology (BSEcT) graduates from the academic years 2019–2020, 2020–2021, 2021–2022, and 2022-2023. Purposive sampling was utilized to ensure the sample accurately represented graduates who could provide valuable insights into the research objectives. This sampling method was selected to align with the study's goal of collecting credible, transferable, dependable, and confirmable data.

Data collection involved administering a structured survey questionnaire created with Google Forms. Graduates were invited to participate through electronic links shared via their social media accounts, ensuring easy access and convenience. The questionnaire gathered both demographic and employment-related information, including:

- Year of graduation,
- Job position and description,
- Salary range,
- Type of company,
- Graduate attributes at work,
- Skills relevance and work ethics

The survey instrument was designed to provide comprehensive insights into the graduates' career trajectories and their alignment with industry demands. To enhance methodological rigor, the inclusion criteria were clearly defined, ensuring that only graduates from the specified academic years were included in the sample.

The questionnaires were distributed through Facebook Messenger, targeting BS in Electronics Technology (BSEcT) graduates from SY 2019–2020 to SY 2022–2023. Responses were submitted online and analyzed at the College of Technology, University of Science and Technology of Southern Philippines. The study assumed participants answered honestly, as anonymity and confidentiality were stressed during data collection.

The collected data were systematically analyzed to identify employment trends, evaluate graduate skills, and understand industry perceptions of skill relevance. This method ensured that the results would help improve curriculum design and meet industry needs effectively. In the descriptive statistics used in this study, the 5-point Likert Scale is utilized with its corresponding adjectival rating.

	Adjectival Rating	Scale Range
1	Strongly Disagree	1.4 - Below
2	Disagree	1.5 – 2.4
3	Neutral	2.5 – 3.4
4	Agree	3.5 – 4.4
5	Strongly Agree	4.5 - Above

Results and discussions

a. Demographics

Purposive sampling was employed to distribute survey questionnaires aimed at analyzing the graduate dynamics of the Bachelor of Science in Electronics Technology (BSEcT) program at the University of Science and Technology of Southern Philippines (USTP). The survey, created using Google Forms, was disseminated through social media platforms to the program graduates from the academic years 2020 to 2023. Out of the 335 graduates, 98 responded to the survey, providing valuable insights into their demographic and employment profiles.

Table 1 shows that the survey retrieval from SY 2019-2020, SY 2020-2021, SY 2021-2022, and SY 2022-2023 yielded a 29.25% return rate. There were 16, 33, 184, and 102 graduates, respectively, who were attempted to be traced during the survey. There were only 37.50% (6/16) of those who graduated in 2020 who responded, while 36.36% (12/33) in 2021, 29.35% (54/184) in 2022, and 30.40% (26/102) in 2023 responded to the graduate tracer.

Table 1: Survey response rate

School Year (SY) Graduated	f	Percentage
SY 2019-2020	6	37.50
SY 2020-2021	12	36.36
SY 2021-2022	54	29.35
SY 2022-2023	26	25.49

b. Industry Placement

Program relevance to some economic activity in the form of occupational placement in the industry might be validated by examining graduate industry employment. The program outcomes and educational outcomes can also be corroborated by the graduates' job placements in various economic sectors. Table 2 describes the industry placement of BSEcT graduates from batch 2019-2020 to batch 2022-2023, which portrays the sector spread where graduates are employed. Many of the graduates are employed in manufacturing, food and beverages, electronics, and production, which garnered the largest number of graduates employed.

Table 2: Industry Placement of BSEcT Graduates

Industry	Frequency			
	Batch 2019-2020 (n=6)	Batch 2020-2021 (n=12)	Batch 2021-2022 (n=54)	Batch 2022-2023 (n=26)
Automotive			2	
Engineering			3	2
Food & Beverage	2	1	6	7
Manufacturing	2		11	4
Production		1	5	3
Semiconductor		2	2	
Electronics		2	6	1
Information Technology		1	2	
Multi-media		1	3	3
Education		2	3	2
Small Medium Enterprise			2	
Telecommunications			3	1
Radio and TV			2	1
CaTV	2	2	4	2

Table 3 shows the industry placement Chi-Square test, which indicates that there is no statistically significant difference in job placement across the different graduate batch groups, with a p-value way above .05. The data do not provide sufficient evidence to conclude that the batch group of graduates affects their job placement.

Table 3: Industry Placement Chi-Square Test

Industry Placement	Chi-Square	df	Probability
Automotive	1.664	3	0.645
Engineering	1.351	3	0.717
Food & Beverage	5.044	3	0.169
Manufacturing	4.658	3	0.199
Production	.790	3	0.852
Semiconductor	6.236	3	0.101
Electronics	2.541	3	0.468
Information Technology	2.210	3	0.530
Multi-media	1.450	3	0.694
Education	2.320	3	0.509
Small Medium Enterprise	1.664	3	0.645
Telecommunications	1.069	3	0.784
Radio and TV	0.698	3	0.874
CaTV	4.690	3	0.196

c. Job Description

The skills and competencies of the graduates are validated following their specific job assignments in their respective industries. By analyzing the job assignments, a job-skills mismatch may be declared. Table 4 specifically displays the job assignments of the graduates from 2020 to 2023. Among the total sampling population of N=98 that responded to the survey, the graduates of Batch 2019-2020 comprised 6.12%, 12.24% for Batch 2020-2021, 55.1% for Batch 2021-2022, and 26.53% for Batch 2022-2023. Instrumentation technician has the highest practitioners, followed by quality control, IT specialists, and production test technicians.

Table 4: Job Description of BSEcT Graduates

Job Description	Batch 2019-2020		Batch 2020-2021		Batch 2021-2022		Batch 2022-2023	
	f	%	f	%	f	%	f	%
Computer Tech					1	1.02	2	2.04
Laboratory Tech			2	2.04	2	2.04		
Communications Tech					4	4.08	1	1.02
Quality Control (Test & Inspection)			4	4.08	7	7.14	2	2.04
Instrument Tech	4	4.08			9	9.18	2	2.04
Industrial Engineer or Tech					2	2.04	2	2.04
Field Service Electronics Tech			3		6	6.12	4	4.08
RF Electronics Tech					1	1.02		
Production Test Tech					7	7.14	4	4.08
Radio/TV Tech					1	1.02	1	1.02
Bio-medical Tech							1	1.02
IT Specialist			1	1.02	7	7.14	3	
Multi-media Specialist	2	2.04	2	2.04	6	6.12	4	4.08
Businessman					1	1.02		

Table 5: Job Description Chi-Square Test

Job Description	Chi Square	df	Probability
Computer Tech	2.714	3	0.438
Laboratory Tech	6.236	3	0.101
Communications Tech	1.645	3	0.649
Quality Control (Test & Inspection)	5.824	3	0.120
Instrument Tech	15.618	3	0.001*
Industrial Engineer or Technologist	1.651	3	0.648
Field Service Electronics Tech	2.673	3	0.445
RF Electronics Tech	.823	3	0.844
Production Test Tech	2.891	3	0.409
Radio/TV Tech	.809	3	0.847
Bio-medical Tech	2.798	3	0.424
IT Specialist	1.026	3	0.795
Multi-media Specialist	2.303	3	0.512
Businessman	0.823	3	0.844

Table 5 shows the summary of the job description Chi-square test, which illustrates that there is no significant association between the graduates' job descriptions and their batch groups, meaning the job placement categories are not related to the batch from which the graduates come; any observed differences in frequencies are due to chance. However, there is a significant difference in the instrumentation technician job description, with a p-value of 0.001*, which tends to reject the null hypothesis in this context.

d. Salary Range

Table 6 presents the salary ranges received by graduates of the BSEcT program in their respective industry placements. Among the batches, the 2021-2022 cohort has the highest number of graduates earning in the higher salary range of ₱21,000 to ₱30,000, followed closely by the 2022-2023 batch. This indicates that even 3 years after graduation, the graduates can earn a living through their skill set developed academically and industry experience.

Table 6: Salary Range of Graduates

Salary Range (PhP)	Batch 2019-2020		Batch 2020-2021		Batch 2021-2022		Batch 2022-2023	
	f	%	f	%	f	%	f	%
10,000.00 – 20,000.00	2	2.04	2	2.04	22	22.45	10	10.2
21,000.00 – 30,000.00	4	4.08	8	8.16	30	30.61	16	16.33
31,000.00 – 40,000.00			2	2.04	2	2.04		

Table 7 provides a detailed analysis of how graduates' salaries vary depending on the industry they work in. Specifically, it shows that those employed in the manufacturing and food and beverage industries tend to earn higher salaries compared to graduates working in other sectors. This suggests that these particular industries offer more competitive pay, likely due to factors such as industry demand, profitability, or the skill sets required, which results in better financial compensation for graduates placed in these fields.

Table 7: Salary Range by Industry

Industry Placement	P10,000.00-P20,000.00		P21,000.00-P30,000.00		P31,000.00-P40,000.00	
	f	%	f	%	f	%
Automotive	2	2.0				
Engineering			5	5.12		
Food & Beverage			16	16.33		
Manufacturing			19	19.39		
Production			9	9.18		
Semiconductor					4	4.08
Electronics	4	4.1	5	5.12		
Information Technology	2	2.0	1	1.02		
Multi-media	7	7.14				
Education	4	4.10	3	3.06		
Small Medium Enterprise	2	2.0				
Telecommunications	4	4.1				
Radio and TV	3	3.06				
CaTV	8	8.16	2	2.0		

Similarly, Table 8 emphasizes the connection between specific job roles and their corresponding salary levels among graduates, revealing that positions in quality control—specifically test and inspection roles within the semiconductor industry—command the highest salaries. This is likely due to the critical nature of these roles in ensuring product reliability and compliance in a highly specialized and technologically advanced industry, which justifies the premium pay. Additionally, roles like instrumentation technician, field service technician, and production test technician are identified as offering competitive mid-range salaries, reflecting their important technical responsibilities and demand in various industries, even if they do not reach the top salary levels of quality control positions in semiconductors. This breakdown highlights how specialized skills and the strategic importance of certain job functions directly influence the salary ranges graduates can expect.

Table 8: Salary Range by Job Description

Job Description	P10,000.00-P20,000.00		P21,000.00-P30,000.00		P31,000.00-P40,000.00	
	f	%	f	%	f	%
Computer Tech	1	1.02	2	2.04		
Laboratory Tech	1	1.02	3	3.06		
Communications Tech	5	5.10				
Quality Control (Test & Inspection)	1	1.02	8	8.16	4	4.08
Instrument Tech	2	2.04	13	13.26		
Industrial Engineer or Techt			4	4.08		
Field Service Electronics Tech	3	3.06	10	10.20		
RF Electronics Tech	1	1.02				
Production Test Tech	1	1.02	10	10.20		
Radio/TV Tech	2	2.04				
Bio-medical Tech	1	1.02				
IT Specialist	7	7.14	4	4.08		
Multi-media Specialist	10	10.2	4	4.08		
Business	1	1.02				

e. Skill Set of BSEcT Graduates

Industry relevance of the BSEcT graduates is measured by assessing the right skill set, competency, and work ethic expectations of the respective industry workplaces. Industry respondents were made to engage in a brief survey containing the aforementioned parameters in a checklist form under their professional judgment concerning the survey questionnaire. Table 9 presents the mean responses regarding the skill sets demonstrated by BSEcT graduates in their respective workplaces, revealing predominantly strong agreement ratings across most skill areas. However, ratings for Math Skills among the 2020 batch (M=3.33) and
Writing Skills for the 2021 batch (M=3.75) were noticeably lower, reflecting a range between neutral and agreement. These findings suggest that although graduates generally manifest the required competencies, there are specific areas where proficiency appears less robust. It is important to consider that these outcomes are likely influenced by multiple factors. While gaps in the academic program or limitations in instructional delivery may have played a role, the significant disruptions caused by the COVID-19 pandemic present a more immediate and compelling

explanation. The abrupt transition to remote learning modalities, constrained opportunities for direct application and practice, and broader social and psychological impacts of the pandemic may have adversely affected students' ability to fully develop and demonstrate certain skills, particularly those requiring sustained practice, such as mathematics and writing. Hence, attributing these variations solely to program inadequacies or graduate incompetence risks oversimplifying the complex educational context during this period. A more nuanced understanding necessitates further investigation, incorporating qualitative data or comparative analysis with pre-pandemic cohorts to delineate the extent to which pandemic-related challenges versus inherent program factors influenced these skill outcomes.

Table 9: Summary of Mean Ratings of Skill Set of Graduates

Skill Set	Batch 2019-2020		Batch 2020-2021		Batch 2021-2022		Batch 2022-2023	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Detail-oriented. Electronics technologists must make and keep the precise, accurate measurements that engineers and technologists need.	4.33	.5164	4.33	.4923	4.37	.4874	4.19	.4019
Dexterity. Electronics technologists, in particular, must be able to use hand tools and soldering irons on small circuitry and electronic parts to create detailed electronic components by hand.	4.16	.408	4.67	.492	4.44	.501	4.307	.471
Interpersonal skills. Electronics technologists must be able to take instructions and offer advice when needed. In addition, they often need to coordinate their work with that of others.	5.0	.000	4.33	.492	4.37	.487	4.307	.471
Logical-thinking skills. To carry out engineering/technology designs, inspect designs for quality control, and assemble prototypes, electronics engineers and technologists must be able to read instructions and follow a logical sequence or a specific set of rules.	5.0	.000	4.5	.522	4.5	.504	4.69	.470
Math skills. Electronics technologists use mathematics for analysis, design, and troubleshooting in their work.	3.33	.516	3.75	.452	4.296	.461	4.23	.429
Mechanical skills. Electronics technologists must be able to apply the theory and instructions of engineers by creating or building new components for industrial applications, machinery, and equipment.	4.0	.000	4.33	.492	4.33	.475	4.308	.471
Writing skills. Electronics technologists must write reports on on-site construction, the results of testing, or problems they find when carrying out designs. Their writing must be clear and well-organized so that the engineers they work with can understand the reports.	4.0	.000	3.75	.452	4.12	.615	4.23	.429

Table 10: Skill Set Kruskal-Wallis Test

Skill Set	Kruskal Wallis	df	Probability
Detail Oriented	2.576	3	.462
Dexterity	6.000	3	0.112
Interpersonal Skills	10.288	3	0.016*
Logical Thinking Skills	7.356	3	0.061
Math Skills	23.412	3	0.000*
Technical Skills	2.848	3	0.416
Writing Skills	6.689	3	0.082

Table 10 provides a summary of the Kruskal-Wallis Test results conducted to compare the skill sets of BSEcT graduates across four batches, from 2019-2020 to 2022-2023. The analysis revealed that there were no statistically significant differences in most of the assessed skills among the batches, suggesting a general consistency in graduate competencies over time. However, notable exceptions were found in interpersonal skills and math skills, where the p-values were 0.016 and 0.000, respectively. Since both p-values are below the conventional significance level of 0.05, the null hypothesis of no difference among batch groups is rejected for these two skill areas. This indicates that there is a statistically significant difference in how graduates from different cohorts are rated in terms of their interpersonal and mathematical abilities. The findings imply that some cohorts performed differently in these particular skill domains, which may warrant further investigation to understand the underlying causes. Such differences could stem from variations in curriculum focus, instructional methods, or external factors such as pandemic-related disruptions that may have affected the development of these skills differently across batches.

f. Graduate Attributes

The BSEcT program was developed with the end goal in mind of adapting the concept of Outcomes-Based Education (OBE). The curriculum development process involved mapping, capturing the university's vision and mission, as well as the perceived graduate attributes that the university envisions its graduates possessing after completing their academic engagements. The vision, mission, and graduate attributes form part of the program outcomes (POs) in the BSEcT. Hence, this study intends to validate the utility of these attributes in the graduates' actual engagements in their respective workplaces. Among the graduates from SY 2019-2020, 2020-2021, SY 2021-2022, and SY 2022-2023 the survey participants manifested these graduate attributes as shown in Table 11, where innovative thinking, critical thinking, resilience, empathy, teamwork and collaboration, communications Skills garnered in agreement adjectival

ratings, which means that the graduates attributes designed at the academic premises are effectively manifesting in their respective workplaces.

The mean ratings of the graduate attributes displayed in their respective workplaces predominantly fall above 4.0 on the rating scale, indicating an overall positive and strong manifestation of these attributes as perceived by respondents. The ratings indicate that graduates consistently demonstrate high levels of performance and capability in the key professional attributes valued by employers. Notably, some attributes show a mean rating of 4.0 with a standard deviation of .000. This perfect uniformity suggests complete agreement among respondents in particular batch groups regarding the consistent exhibition of these attributes, emphasizing a strong consensus on graduates' effective performance. An exception is observed with the attribute of innovative thinking skills, which shows a relatively lower mean rating of 3.67. This lower score highlights a potential area for growth and development, where graduates may be demonstrating slightly less proficiency or opportunity in innovation-related competencies compared to other attributes. It signals the need for focused attention or enhancement strategies in cultivating innovation capabilities among graduates.

Table 11: Mean ratings of BSEcT graduates' attributes

Attributes	Batch 2019-2020		Batch 2020-2021		Batch 2021-2022		Batch 2022-2023	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Innovative Thinking	3.67	.514	4.17	.717	4.28	.596	4.65	.485
Critical Thinking	4.33	.516	4.42	.514	4.54	.503	4.38	.496
Resilience	4.0	.000	4.5	.522	4.61	.492	4.46	.508
Empathy	4.50	.547	4.33	.492	4.46	.503	4.23	.429
Teamwork & Collaboration	4.33	.516	4.58	.514	4.48	.504	4.53	.508
Communications Skills	4.00	.000	4.33	.492	4.51	.504	4.50	.509

Table 12: Mean responses of work ethics of the BSEcT graduate

Work Ethics	2019-2020		2020-2021		2021-2022		2022-2023	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1. Appearance: Displays proper dress, grooming, hygiene, and manners.	5.0	.000	4.5	.522	4.44	.501	4.38	.496
2. Attendance: Attends work, arrives and leaves on time, tells supervisor in advance of planned absences, and makes up assignments promptly.	5.0	.000	4.67	.492	4.51	.504	4.46	.508
3. Attitude: Shows a positive attitude, appears confident, and has true hopes for self.	4.5	.548	4.5	.522	4.44	.501	4.26	.452
4. Character: Displays loyalty, honesty, dependability, reliability, initiative, and self-control.	5.0	.000	4.41	.514	4.42	.499	4.15	.367
5. Communication: Displays proper verbal and non-verbal skills and listens.	4.5	.547	4.16	.389	4.27	.452	4.73	.452
6. Cooperation: Displays leadership skills; properly handles criticism, conflicts, and stress; maintains proper relationships with peers and follows the chain of command.	5.0	.000	4.41	.514	4.5	.504	4.57	.503
7. Organizational Skill: Shows skills in management, prioritizing, and dealing with change.	4.5	.547	4.33	.492	4.42	.499	4.65	.485
8. Productivity: Follows safety practices, conserves resources, and follows instructions.	4.67	.516	4.5	.522	4.59	.495	4.34	.485
9. Respect: Deals properly with diversity and shows understanding and tolerance.	5.0	.000	4.33	.492	4.5	.504	4.46	.508
10. Teamwork: Respects the rights of others, is a team worker, is helpful, is confident, displays a customer service attitude, and seeks continuous learning.	4.5	.547	4.41	.514	4.33	.475	4.34	.485

Table 13 presents the analysis of work ethics ratings related to character and communication across different respondent batch groups. The findings show statistically significant differences in these two work ethics parameters, with p-values of 0.001 and 0.000, respectively, both below the conventional significance threshold of 0.05. This statistical evidence indicates that the null hypothesis of no difference in ratings among batches can be rejected, meaning that at least one batch group differs significantly from the others in terms of character and communication as aspects of work ethics. These differences suggest variability in how graduates from different cohorts demonstrate or are perceived in these ethical dimensions, which may result from changes in instructional emphasis, external socioeconomic influences, or evolving workplace demands over time. For the other work ethics parameters examined, p-values exceeded 0.05, indicating no statistically significant differences across the batches. This lack of significant variance suggests that perceptions or ratings of those work ethic characteristics are consistent among all respondent groups. The results imply stable outcomes for these ethical traits across cohorts, possibly reflecting effective and uniform program delivery in those areas. Overall, the data highlights specific work ethic attributes that vary between cohorts, providing insight into potential focus areas for program enhancement and continuous quality improvement efforts.

Table 13: Summary of work ethics Kruskal-Wallis test

Skill Set	Kruskal Wallis	df	Probability
1. Appearance	7.634	3	.054
2. Attendance	6.542	3	.088
3. Attitude	2.970	3	.396
4. Character	15.678	3	.001*
5. Communications	18.030	3	.000*
6. Cooperation	6.273	3	.099
7. Organizational skills	4.776	3	.189
8. Productivity	4.776	3	.189
9. Respect	7.411	3	.060
10. Teamwork	.857	3	.836

Conclusion

The study draws its conclusions from the most significant results of the study, which are anchored on the occupational placement of the BSEcT graduates in various economic sectors in the country. This study has provided insightful evidence on several key dimensions influencing the employability and workplace performance of graduates. The

significant differences found in the interpersonal skills, mathematical skills, character, and communication across batches highlight the dynamic nature of graduate development and underscore the importance of continuous enhancement in these core competencies.

A particular note is the significant association between the instrumentation technician job description and the graduate's batch group, as revealed by the Chi-square test (p=.001). This finding indicates that the job placement in this specific role varies meaningfully across batches, underscoring factors in curriculum, training, or industry demand that differentially impact employment outcomes in this field.

The uniformly high mean ratings across work ethics parameters and graduate attributes reflect a strong manifestation of positive professional qualities exhibited by graduates in their workplaces. Perfect agreement, marked by mean ratings of 4.0 or 5.0 with zero standard deviations, demonstrates consistent excellence in particular attributes that are reliably sustained across cohorts.

Conversely, areas such as innovative thinking skills, with relatively lower mean scores, point to opportunities for targeted development. Addressing these gaps can further enhance graduates' adaptability and creativity, which are considered critical qualities in evolving industries.

This study affirms that while graduates exhibit commendable professional skills and work ethics valued by employers, intentional efforts remain vital to foster innovative and refine competencies. The findings advocate for integrated academic and workplace strategies to holistically prepare graduates for multifaceted career demands. This contributes meaningfully to the discourse on graduate readiness and sets a foundation for policy enhancements, curriculum development, and interventions aimed at advancing graduate employability and performance.

References

1. AACCUP. OBE Accreditation Instrument, 2015.
2. Abouelenein YAM. Training needs for faculty members: Towards achieving quality of university education in the light of technological innovations. Educational Research and Reviews,2016:11(13):1180–1193.
3. Ahmad SR, Isa N, Liaw A, Nazari ML, Abdullah NP, Rani MH, Lokman AM. Enhancing employability and empowerment: Unveiling factors within PERDA-TECH for sustainable development. Journal of Technical Education and Training,2023:15(3):235–244.
4. Bui HT. Building multidisciplinary programmes that engage industry: A critical task for higher education to enhance graduate employability. In Innovate Higher Education to Enhance Graduate Employability, 2019, 9–19.
5. Chao RY Jr. Higher education in the Philippines. In International Handbook on Education in South East Asia, 2021, 1–28.
6. Chukwuma CM, Ibe VT. Quality and Equitable Access to Education: A Catalyst for Sustainable Economic Development in Nigeria. African Journal of Educational Research and Development, 2024, 15(4).
7. Conchada MIP, Tiongco MM. A review of the accreditation system for Philippine higher education institutions, 2015.
8. Cook DA, Hatala R. Validation of educational assessments: a primer for simulation and beyond. Advances in Simulation,2016:1:1–12.
9. Costin C. How universities can respond to the new demands of the labor market and society, 2015.
10. Cuadra LJ, Aure MRKL, Gonzaga GL. The use of tracer study in improving undergraduate programs in the university. Asia Pacific Higher Education Research Journal, 2019, 6(1).
11. De Guzman MFD, Edaño DC, Umayan ZD. Understanding the Essence of the Outcomes-Based Education OBE and Knowledge of its Implementation in a Technological University in the Philippines. Asia Pacific Journal of Multidisciplinary Research,2017:5(4):64–71.
12. Dotong CI, Laguador JM. Philippine quality assurance mechanisms in higher education towards internationalization. Studies in Social Sciences and Humanities,2015:3(3):156–167.
13. Gaston PL. Higher education accreditation: How it's changing, why it must. Taylor Francis, 2023.
14. Hernandez-de-Menendez M, Escobar Díaz CA, Morales-Menendez R. Engineering education for smart 4.0 technology: a review. International Journal on Interactive Design and Manufacturing,2020:14(3):789–803.
15. Jemeli CM, Fakandu AM. Equitable Access to Education and Development in a Knowledgeable Society as Advocated by UNESCO. Educational Research and Reviews,2019:14(6):200–205.
16. Kipper LM, Iepsen S, Dal Forno AJ, Frozza R, Furstenau L, Agnes J, *et al*. Scientific mapping to identify competencies required by industry 4.0. Technology in Society,2021:64:101454.
17. Kumar P, Shukla B, Passey D. Impact of accreditation on quality and excellence of higher education institutions. Revista Investigacion Operacional,2020:41(2):151–167.
18. Makhoul SA. Higher education accreditation, quality assurance, and their impact to teaching and learning enhancement. Journal of Economic and Administrative Sciences,2019:35(4):235–250.
19. Mappatao GP. The Periodic PEO Review Process of the BSECE Program of De La Salle University. Advanced Science Letters,2018:24(11):8434–8438.
20. Premalatha K. Course and program outcomes assessment methods in outcome-based education: A review. Journal of Education,2019:199(3):111–127.
21. Qureshi S, Malkani R, Rose R. Achieving inclusive and equitable quality education for all. Handbook on promoting social justice in education, 2020, 3–32.
22. Raja Santhi A, Muthuswamy P. Industry 5.0 or industry 4.0 S? Introduction to industry 4.0 and a peek into the prospective industry 5.0 technologies. International Journal on Interactive Design and Manufacturing (IJIDeM),2023:17(2):947–979.
23. Santos G, Marques CS, Justino E, Mendes L. Understanding social responsibility's influence on service quality and student satisfaction in higher education. Journal of cleaner production,2020:256:120597.
24. Shaheen N, Shaheen A, Ramadan A, Hefnawy MT, Ramadan A, Ibrahim IA, *et al*. Appraising systematic reviews: a comprehensive guide to ensuring validity

and reliability. Frontiers in research metrics and analytics,2023:8:1268045.
25. Strong MH, Burkholder GJ, Solberg EG, Stellmack A, Presson WD, Seitz JB. Development and Validation of a Global Competency Framework for Preparing New Graduates for Early Career Professional Roles. Higher Learning Research Communications,2020:10(2):67–115.
26. Suleman F. The employability skills of higher education graduates: insights into conceptual frameworks and methodological options. Higher Education,2018:76(2):263–278.
27. Syeed MM, Shihavuddin ASM, Uddin MF, Hasan M, Khan RH. Outcome-based education (OBE): Defining the process and practice for engineering education. IEEE Access,2022:10:119170–119192.
28. Vong C. Tracer Study 2014 Graduates of Year 2012. Royal University of Phnom Penh, 2015.