



Evaluation Of Educational Sustainability Knowledge And Practices Of Engineering Undergraduate Programs Of Selected SUCS In Calabarzon

Abstract: This study evaluated the educational sustainability knowledge and practices of undergraduate engineering programs in state universities and colleges (SUCs) in the CALABARZON Region. Utilizing a descriptive-correlational research design, 1,020 students and 56 regular faculty members were selected through appropriate sampling techniques. A validated survey instrument was used to measure sustainability knowledge and practices across key dimensions, including environmental, social, economic, and institutional management aspects. The findings reveal that both students and faculty members demonstrated a very high level of educational sustainability knowledge while the level of educational sustainability practices was also interpreted as very high, indicating that sustainability principles are strongly observed within the engineering programs of SUCs in the region. The independent sample t-test showed that there is no significant difference between the knowledge and practices of students and faculty members which indicates that both students and faculty members have comparable levels of knowledge and practices regarding educational sustainability. Moreover, there was a significant positive relationship between educational sustainability knowledge and practices, suggesting that higher levels of knowledge are associated with greater engagement in sustainable practices among the students and faculty members. The findings indicate that SUCs in CALABARZON have successfully integrated sustainability concepts into their engineering programs. However, there is a need for continuous efforts to further strengthen institutional policies, resource allocation, and program implementation to sustain and enhance these initiatives.

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1. Introduction

Sustainability awareness is a foundational necessity to navigate the challenges of the modern world. This is not a mere trend of simply adopting what is timely nowadays. Raising awareness on sustainability does not only mean informing minds; instead, it deals on transforming our hearts, decisions and even the systems. The need for high-quality education in sustainability has continuously increased and is becoming more urgent than ever, especially in the Engineering profession where global leaders play a critical role in shaping the future for the next generations. Higher education institutions (HEIs), particularly those which are offering Engineering programs, are facing critical responsibility in the promotion of awareness in sustainability among their students. These future engineers are expected to play a pivotal role in shaping infrastructure, industry, energy systems and even technology. It is therefore imperative that their education is equipped with the knowledge, skills, and



values in designing and implementation of sustainable solutions.

Educational sustainability is the capacity of educational system to ensure equity, quality and resilience across generations. It is focused on the long-term development by ensuring that learning environments, curricula, and institutional operations can adapt to social, economic, and environmental changes. There are four main dimensions of Educational Sustainability specifically environmental, social, economic, and institutional management or governance. The concept of improving this educational system is aligned with UNESCO's vision of "Education for Sustainable Development" (ESD), which positions education as a transformative force that equips learners with values, knowledge, and skills needed to contribute to a sustainable future (UNESCO, 2017). Since the goal is to make the institution more responsive to the needs of the communities and its learners, promotion for lifelong learning, adaptability, educational sustainability, and inclusivity must be taken into full consideration.

From an institutional perspective, educational sustainability encompasses governance, resource management, and strategic planning that support long-term academic excellence. Institutions must adopt effective governance mechanisms that emphasize transparency, accountability, and participatory decision-making to maintain trust and adaptability (Tilbury, 2011). Sustainable educational systems also integrate environmental stewardship, such as energy efficiency, waste reduction, and green campus initiatives, into institutional practices. These efforts not only reduce ecological impact but also model sustainable behaviors for students and society (Sterling, 2014). When governance, resources, and environment work cohesively, institutions can maintain resilience and relevance even amid disruptions.

Finally, educational sustainability is achieved through the alignment of curriculum, pedagogy, and community engagement. Curriculum that integrates sustainability concepts fosters critical thinking, systems thinking, and global citizenship among learners (UNESCO, 2020). Pedagogical approaches such as project-based learning, experiential learning, and interdisciplinary instruction support deeper understanding and real-world application of sustainability principles. Additionally, strong engagement with communities, industries, and policymakers enhances the relevance and impact of educational programs, enabling institutions to contribute to societal development and innovation (Barth & Rieckmann, 2016). Through these combined efforts, educational sustainability becomes a holistic framework that supports transformative education for current and future generations.

According to UNESCO (2017), HEIs are uniquely positioned to lead the global transition toward sustainable development through education, research, and community engagement. They are expected not only to impart technical knowledge but also to foster values and competencies related to sustainability, such as critical thinking, systems thinking, and ethical responsibility. UNESCO (2017) also argues that education for sustainable development (ESD) must be embossed across all disciplines, especially in engineering, where future graduates will make decisions with long-term environmental and social consequences.

However, there are challenges being faced by the HEIs in embedding and disseminating sustainability awareness particularly the Engineering students despite their growing recognition for the advancement of sustainability. Some of the challenges are curriculum overload and the limited student engagement on sustainability. Because



Engineering programs are typically considered to be rigid and content-heavy, there seems to be little room for the inclusion of interdisciplinary subjects or focus such as sustainability. [Lozano et al. \(2013\)](#) observed that sustainability content is often “marginalized or added as electives” rather than being integrated into core courses, leading to inconsistent or superficial coverage. [Filho et al. \(2018\)](#) noted that while students show general support for sustainability, few understand how it relates to their discipline or future careers without explicit, practical connections being made.

Sustainability remains to be an important aspect of higher education. Unfortunately, different studies show that there have been knowledge gaps among the students, educators, and even institutions. Despite advocacies from around the world, several research reveals that many students particularly the STEM and other Engineering programs lack sufficient knowledge and understanding on sustainability.

According to [Foulks and Fournier \(2023\)](#), higher education students exhibit limited factual knowledge of sustainability principles and have misconceptions on core environmental and socio-economic issues. Similarly, [Yuan and Zuo \(2013\)](#) identified significant deficiencies in students’ comprehension of sustainability, particularly among engineering students, who struggled to connect sustainability concepts with real-world professional practices. These gaps prove that sustainability knowledge is not yet deeply embedded in many academic disciplines and thus need further attention.

Issues on curriculum also contribute to this knowledge gap sustainability. [Lozano et al. \(2019\)](#) emphasized that many universities do not fully and systematically integrate sustainability into their curriculum, resulting to inconsistency in students’ exposure to sustainability. Their review highlighted that

although sustainability themes are sometimes present, they are often taught only at a theoretical level without practical application. [Aleixo et al. \(2020\)](#) further noted that students’ training in sustainability remains uneven across programs, partly due to insufficient alignment in curriculum and insufficient institutional strategies that support competencies related to sustainability.

Another important factor that contributes to this knowledge gap is the lack of awareness and involvement. According to [Filho et al. \(2018\)](#), students can identify the advantage and relevance of sustainability yet do not fully comprehend its vast nature, specifically the social and economic sustainability. This indicates that awareness does not connote deeper understanding.

The challenges in achieving the relevant engagement in sustainability education was given emphasis citing that students have the tendency to disregard the need for and importance of sustainability in their everyday living and to possible career that may be provided to them ([Redman, 2013](#)).

The support of the institutions and the capacity of its teaching personnel have played a great role in shaping the knowledge of the students towards sustainability. Due to limited training and unclear policies and programs, many educators remain unprepared to teach sustainability. According to [Wals \(2015\)](#), insufficient commitment from the schools and lack of expertise among faculty members hinder sustainability among learners. As a result, the mentioned limitations block the opportunities for the students to develop competencies in sustainability through community engagements and other relevant experiential learnings.

Despite recognition on the importance of sustainability awareness, significant gaps remain to be an issue between students’ knowledge, curricula, integration, institutional



policies and teaching capacity. Addressing the mentioned gaps necessitates a holistic approach particularly in the faculty development, curriculum redesign, policy enhancement and providing students' engagement to more sustainable programs.

Also, it is of great importance that the integration of sustainability in Engineering curricula be considered with utmost consideration. [Accreditation Board for Engineering and Technology \(ABET\) accreditation standards \(2023\)](#) now require that graduates be able to consider the impact of engineering solutions in global, economic, environmental, and societal contexts. It further gives emphasis on the established criterion that embeds competencies that are sustainability-related in the student outcomes and program criteria with due considerations on environmental, societal, and global impact. This aligns with calls from scholars like [Mulder et al. \(2012\)](#) to treat sustainability as a foundational learning outcome.

The establishment of the Sustainable Development Goals (SDGs) by the United Nations that serves as a universal set of goals, targets, and indicators for global development effort aims to end poverty, protection of the planet, and ensuring peace and prosperity for all. These SDGs are applied to all nations regardless of income or development level and are interlinked where progress of one affects the progress of others such as clean energy impacts health, education, and climate. These goals are rooted in equity and inclusion focusing on the most vulnerable populations. As this study focused on Educational Sustainability, Sustainable Development Goal 4 (SDG 4) was given emphasis. This SDG 4 is focused on the global commitment to ensure inclusive, equitable, and quality education for all learners across all levels. It recognizes the importance of education as a basic human right and will serve as driving force for social progress, economic growth, and environmental

protection. It also integrates the broader vision of sustainable development by upholding Education for Sustainable Development and global citizenship education. This dimension encourages academic institutions to include social responsibility, environmental awareness, gender equality, cultural equality, and education within teaching and learning process. With the alignment of educational goals to sustainability principles, the learners will be equipped with the knowledge, values, and competencies needed to address the present and future challenges.

This study also covered Sustainable Development Goal 16 (SDG 16) which upholds peaceful and inclusive societies. This goal highlights the essential foundations for sustainability such as stability, peace, and competent governance structures. This mainly involves the protection of human rights, elimination of corruptions, enhancement of public participation, and creation of institution that will attend to the needs of the community efficiently. With SDG 16, individuals will be protected from social injustice and will encourage them to contribute to a more meaningful civic and economic life. In addition, SDG 16 ensures government transparency by the provision of accountability mechanism and accurate information.

For educational institutions, SDG 16 reinforces the importance of governance systems that promote fairness, ethical leadership, and responsible management. Schools and universities play a vital role in cultivating values such as peace, human rights, and responsible citizenship among learners. Ultimately, SDG 16 contributes to the creation of resilient societies where justice prevails, trust in institutions is strengthened, and individuals can thrive within safe and inclusive environments.



However, there are some challenges that hinder SDG progress such as funding gaps, conflicts on policy, and the availability of data since many countries still lack reliable data to monitor indicators. These challenges may hinder the effectiveness of Education for Sustainable Development. To effectively address the difficulties of sustainability in the Engineering profession, it is critical to analyze undergraduate Engineering students' present level of sustainability knowledge and practices (Beagon et al., 2022). To encourage responsible and sustainable engineering practices, it is important to include sustainability into engineering education. But these targets can only be achieved if there are proper analysis and evaluation on the status of the knowledge and practices towards educational sustainability. It is therefore the aim of this study to have an avenue for evaluation of the knowledge and practices of Engineering students and faculty members related to sustainability to provide critical lens that will assess and improve educational sustainability of Engineering programs in selected state universities and colleges in CALABARZON.

2. Purpose of the Research

The primary objective of the study was to evaluate the undergraduate Engineering programs' educational sustainability knowledge and practices in selected SUCs in CALABARZON.

Specifically, it aimed to answer the following questions:

1. What is the demographic profile of the respondents in terms of:

1.1. for engineering students

- a. age?
- b. sex?
- c. program?
- d. year level?
- e. institution?

1.2. for faculty members

- a. institution?

- b. rank/position?
- c. number of years in service?
- d. engineering program?

2. What is the respondents' level of knowledge on educational sustainability in terms of the following dimensions:

- 2.1. environmental sustainability?
- 2.2. social sustainability?
- 2.3. economic sustainability?
- 2.4. institutional management?

3. What is the respondents' level of practices on educational sustainability in terms of:

- 3.1. environmental sustainability?
- 3.2. social sustainability?
- 3.3. economic sustainability?
- 3.4. institutional sustainability?

4. Is there a significant difference between the educational sustainability knowledge and practices of engineering students and faculty members?

5. Is there a significant relationship between the educational sustainability knowledge and practices of engineering students and faculty members?

6. What are the problems encountered by the students and faculty members in the implementation of educational sustainability practices?

7. What are the strategies that provide greater impact on the development of educational sustainability?

Significance of the Research

Results of this study is of significant value to the following:

Higher Education Institutions. This study could help academic institutions to effectively promote sustainability through evidence-based practices and comprehensive evaluation. This



could provide insights to guide policymakers and administrators in strengthening programs specifically engineering disciplines for strategy improvements and other policies that support long-term quality and resilience.

Curriculum Planners. The findings could be an avenue for the improvement and development of Engineering curriculum and more effective integration of sustainability concepts. These universities and colleges could use the outcome to properly align the established engineering programs with the national and international goals in relation to sustainability. This could also lead to the creation of policies and programs that promote campus practices and students' engagement towards sustainability more effectively.

Community. The findings of this study could enable the communities to be more responsive to local sustainability issues as they could be future partners of the institutions for the alignment of their sustainability goals. This study could also contribute to building a more sustainable and empowered communities for a more inclusive and collaborative programs in achieving developmental goals.

Students. This study could provide awareness among students on their attitudes and behaviors toward sustainability, thus allowing them to further reflect of these behaviors if acceptable within their level. Their perception on the matter is very crucial as they could contribute to fostering a culture of sustainability in academic setting and their professional endeavor in the future. It could also be noted that through this evaluation on the knowledge and practices of undergraduate Engineering students, there would be a channel for converting these theoretical understanding into acceptable and practical course of actions. It could allow future engineers to be equipped in the implementation of sustainable solutions

in a more complex and real-world engineering contexts.

Researcher. This study provides the researcher an in-depth knowledge on the status of the awareness and practices of the undergraduate Engineering students as she participates on the curriculum mapping and enhancement to improve Engineering curriculum in her field, specifically Industrial Engineering, to deliver a more comprehensive and sustainable engineering programs, policies, and curriculum. This leads to assessment on the students' understanding on the concepts of sustainability in terms of environmental, social, and economic aspects. It further targets the evaluation of sustainability practices, common behaviors, and habits that reflect sustainable living inside and outside the campus. This also helps in the enrichment of the existing literature on sustainability awareness.

Future Researchers. This research could also serve as reference for future studies particularly on literature about sustainability education. For future similar studies, this would help to identify progress over time or allow comparison of the outcomes across other institutions and even worldwide.

3. Methods

Research Design/Research Instrument/Data Gathering Procedures

This study utilized a quantitative descriptive-correlational research design to systematically examine the educational sustainability knowledge and practices of Engineering students and faculty members and to determine the relationship between these variables. The descriptive research was used to describe the level of knowledge and practices of the Engineering students and faculty members on educational sustainability. This type of research is applicable for the study since it is focused primarily on the collection of numerical data to illustrate the current



conditions. This design is utilized to allow for the systematic description and numerical analysis of students' awareness and behavior regarding educational sustainability. Likewise, the quantitative approach identifies the collection and analysis of numerical data to measure variables and test relationships using statistical techniques. According to [Creswell \(2014\)](#), quantitative research is appropriate when the objective is to quantify variables, generalize findings from a sample to a population, and examine relationships among variables through statistical analysis. In this study, numerical data were gathered through a structured and validated survey instrument and analyzed using descriptive and inferential statistics.

A self-administered questionnaire was employed to assess the sustainability knowledge and practices of undergraduate Engineering students and faculty members. According to [Bryman \(2016\)](#), self-administered questionnaires are survey instruments completed by respondents themselves, designed to collect standardized information from a large sample. This self-administered questionnaire is one of the most common methods of gathering data in quantitative and survey-based research as it allows researchers to gather data efficiently and ensure consistency in responses. Pre-testing of the survey questionnaire was performed to undergo validity and reliability testing where a five-point assessment scale was utilized. According to [Creswell et al. \(2018\)](#) pilot-testing is essential in research because it allows the researcher to evaluate the clarity, reliability, and functionality of research instruments before full deployment. By administering the questionnaire or tool to a small sample similar to the target population, the researcher can identify ambiguities, confusing items, technical issues, or weaknesses in the instrument's structure. This process helps to refine questions, improve response options, and

ensure that the instrument measures what it is intended to measure. Pilot-testing also helps estimate the time needed for completion and assess initial reliability indicators such as Cronbach's alpha. Overall, it strengthened the validity, accuracy, and effectiveness of the research instrument, reducing errors and increasing the credibility of the final data collection.

Meanwhile, the following steps were performed systematically for the gathering of relevant data to be used for the study:

The researcher developed a structured questionnaire to measure the sustainability knowledge and practices aligned with the dimensions of educational sustainability such as environmental, social, economic, and institutional management.

The draft instrument was submitted to at least five experts in sustainability, Engineering education and other related fields for content validation.

Revisions were made according to the comments and suggestions of the experts to ensure clarity and alignment with the established research objectives.

The validated questionnaire underwent pilot-testing among 30 respondents with similar characteristics as the respondents.

Reliability tests using Cronbach's Alpha was conducted to check for internal consistency. The reliability analysis revealed that the instrument possesses acceptable to excellent internal consistency across all constructs, with coefficients ranging from 0.753 to 0.969. Knowledge-related variables demonstrated acceptable to good reliability, while practice-related variables, problems, and recommended solutions exhibited excellent reliability. The overall reliability coefficient of 0.969 indicates that the instrument is highly consistent and



suitable for measuring educational sustainability constructs among respondents. (Please refer to the appendices for the tabulated value for Cronbach's Reliability Testing.)

Necessary adjustment was done based on the test performed.

A formal request letter was submitted to target state universities and colleges for the conduct of the study. The researcher then identified target respondents through cluster sampling method.

Upon approval by the SUCs, the researcher proceeded to the distribution of questionnaires. Google Forms were used to efficiently gather responses considering the location of the respondents. Although there were instances when the researcher needed to visit all the SUCs to effectively gather the data to accomplish the required number of respondents.

Respondents of the Study

The undergraduate Engineering students and faculty members of selected state universities and colleges within CALABARZON served as respondents of the study. There were 1,020 Engineering students and 56 regular faculty members who participated in the study. The Engineering programs that were subjected for study are Electrical, Mechanical, Electronics, Computer, Civil, and Industrial Engineering. Specifically, the data derived from the selected respondents in terms of demographic characteristics of respondents, the assessment on the respondents' knowledge and practices

towards educational sustainability in terms of environmental, economic, social, and institutional management were gathered through the research instrument that was administered to the target respondents.

Sampling Design and Procedures

Cluster random sampling was used to select the participants of the study. First, the entire population of undergraduate Engineering students in the selected SUCs was identified. These Engineering students are naturally grouped into clusters based on their programs, year levels, and class sections. Google links were sent to Engineering students and faculty members. Continuous follow-up on the target respondents was done until the required sample size was achieved. Employing cluster random sampling allowed efficient gathering of data from a large population while maintaining representativeness from each group.

In identifying the number of target respondents, the researcher utilized the G* Power to determine the sample size. G*Power is a statistical software that is used to calculate required sample sizes and power analysis for a wide range of statistical tests. Developed by [Faul et al. \(2007\)](#), it allows researchers to determine the minimum number of participants needed to detect an effect with a specified confidence level. This provides a scientifically justified sample size rather than relying on approximate formulas.



Table 1 Sample Size Identification Using G* Power

Engineering Students			
SUC	Population	Sample Size Using G* Power	Actual Respondents
University A	1697	120	126
University B	1704	117	26
University C	837	90	228
University D	2080	120	105
University E	2092	336	535
Total	8410	783	1020
Faculty Members			
SUC	Population	Actual Respondents	
University A	30	2	
University B	16	11	
University C	7	4	
University D	40	22	
University E	24	18	
Total	117	57	

Research Locale/Study Site

This study was conducted in selected state universities in CALABARZON specifically, University A from Cavite, University B from Laguna, University C from Batangas, University D from Rizal, and University E from Quezon. The researcher chose these state universities as they represent every province within CALABARZON.

The researcher believed that similar to the knowledge gaps and other challenges in educational sustainability presented in this study, the mentioned research locale also exhibit the same challenges. These universities are believed to have similar concerns and thus needing deeper understanding on educational sustainability.

Research Paradigm/Conceptual Framework

Educational sustainability in engineering education aims to equip students with the knowledge, skills, and attitudes needed to design and implement solutions that balance environmental protection, economic viability, and social equity. A conceptual framework on

sustainability for Engineering students provides a structured model that links educational inputs, learning processes, and sustainability outcomes to promote holistic and responsible engineering practice.

This framework integrates the four dimensions of educational sustainability—environmental, social, economic, and institutional management/governance—with the pedagogical principles of education for sustainable development (ESD). It recognizes that Engineering students play a critical role in achieving the Sustainable Development Goals (SDGs) by designing technologies and systems that contribute to long-term societal development. This study is guided by a research paradigm grounded in the four core dimensions of Educational Sustainability: environmental, social, economic, and institutional governance. These dimensions serve as the foundation for evaluating the sustainability knowledge and practices of undergraduate engineering programs of SUCs. The paradigm assumes that sustainability in education is multidimensional, interconnected, and dependent on the integration of

sustainability knowledge and practices. Demographic profiles and these dimensions represent the foundational data collected through survey questionnaires.

The quantitative data were analyzed to identify the levels within the four dimensions of educational sustainability specifically, environmental, social, economic and institutional management/governance. Descriptive and inferential statistics were used to evaluate the strength of sustainability knowledge and practice influencing educational sustainability. Through data integration, the process evaluated how these dimensions interact and reinforce one another within Engineering education programs. The result reflects the evaluated level of sustainability knowledge and practices of Engineering students, highlighting areas of strength, gaps, and opportunities for enhancement in SUCs. This included identifying which dimensions are most developed or lacking, determining the alignment of programs with sustainability goals, and producing evidence-based recommendations for curriculum improvements, institutional policies, and capacity-building initiatives.

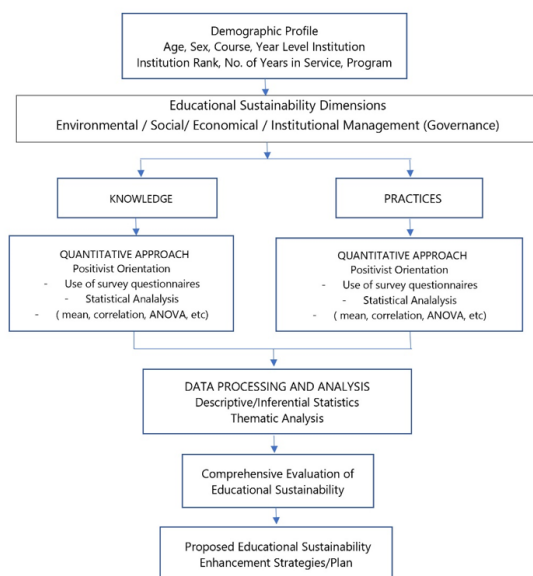


Figure 1 Research Paradigm

3. Results and Discussion

This part presents the analysis and interpretation of the data gathered specifically on the level of knowledge and practices of the Engineering students and faculty members regarding educational sustainability. The results are organized based on the specific research questions and are presented utilizing different statistical tools such as frequency, percentage, weighted mean, standard deviation, independent sample t-test, and correlation statistics.

In addition, this portion highlights significant patterns and trends observed from the gathered data which consequently served as the basis for the conclusions and recommendations of the study.

For confidentiality purposes, the participating SUCs were not specifically identified and instead the corresponding province they represent was mentioned.

Part I. Demographic Profile of Students and Faculty Members

Table 2 shows the demographic characteristics of the student-respondents that provided important context for understanding the distribution and representativeness of the sample in this study.

In terms of age, most of the respondents fall within the 19–20 years old bracket, comprising 41% ($n = 417$) of the total sample. This is followed closely by those aged 21–22 years old accounting for 39% ($n = 395$). These findings indicate that most of the participants are within the typical age range of undergraduate Engineering students, particularly those in the middle years of their academic programs. Meanwhile, 14% ($n = 148$) are aged 17–18, representing younger students who are likely in the early stages of their college education. Only a small proportion, 6% ($n = 60$), are aged 23 and above, suggesting relatively fewer non-



traditional or delayed-entry students. Overall, the age distribution reflects a youthful and academically active population, which is appropriate for examining educational sustainability in higher education settings.

With regard to sex, the respondents are relatively balanced, with a slight predominance of male students (53%, $n = 537$) compared to female students (47%, $n = 483$). This near parity suggests increasing gender inclusivity in Engineering programs, although male students still slightly outnumber females, which is consistent with traditional trends in engineering education.

In terms of program, the largest proportion of respondents are enrolled in Bachelor of Science in Electronics Engineering (BSECE), comprising 37% ($n = 377$) of the sample. This is followed by Bachelor of Science in Industrial Engineering (BSIE) with 30% ($n = 301$). Other programs such as Bachelor of Science in Electrical Engineering (BSEE) account for 16% ($n = 164$), while Bachelor of Science in Civil Engineering (BSCE) and Bachelor of Science in Mechanical Engineering (BSME) represent 9% ($n = 93$) and 7% ($n = 72$), respectively. Notably, Bachelor of Science in Computer Engineering (BSCpE) has the smallest representation at 1% ($n = 13$). This uneven distribution suggests that certain programs, particularly BSECE and BSIE, are more heavily represented in the study, which may influence the overall findings toward the perspectives common within these disciplines.

Regarding year level, the data indicate that 1st year students constitute the largest group, accounting for 30% ($n = 306$). This is followed by 3rd year students (25%, $n = 259$) and 4th year students (25%, $n = 250$), while 2nd year students (20%, $n = 205$) constitute the smallest proportion. The relatively even distribution across year levels suggests that the study captures perspectives from students at

different stages of their academic journey, from entry-level to near graduation. This diversity is beneficial for assessing how knowledge and practices of educational sustainability may vary with academic exposure and experience. In terms of school affiliation (state universities and colleges), more than half of the respondents come from Quezon, representing 52% ($n = 535$) of the sample. This is followed by Rizal with 22% ($n = 228$). Other participating institutions include Cavite with 13% ($n = 126$), Rizal with 10% ($n = 105$), and Laguna with 3% ($n = 26$). The dominance of respondents from Quezon suggests that the findings may be more reflective of the context and practices within this institution, while still incorporating perspectives from other SUCs for comparative insight.

Overall, the demographic profile of Engineering students indicates that the respondents are predominantly young, fairly gender-balanced, and distributed across various engineering programs and year levels, with a strong representation from selected state universities. This diversity supports the generalizability of the findings within similar higher education contexts, although the concentration in certain programs and institutions should be considered when interpreting the results.

Table 2 Distribution of Student-Respondents as to Demographic Profile

Category	Sub-Categories	Frequency	Percentage
Age	19 – 20	417	41%
	21 – 22	395	39%
	17 – 18	148	14%
	23 and above	60	6%
	Total	1020	100%
Sex	Male	537	53%
	Female	483	47%
	Total	1020	100%

Course	BSECE	377	37%
	BSIE	301	30%
	BSEE	164	16%
	BSCE	93	9%
	BSME	72	7%
	BSCPE	13	1%
	Total	1020	100%
Year Level	1 st Year	306	30%
	3 rd Year	259	25%
	4 th Year	250	25%
	2 nd Year	205	20%
	Total	1020	100%
School (SUC)	Quezon	535	52%
	Batangas	228	22%
	Cavite	126	13%
	Rizal	105	10%
	Laguna	26	3%
	Total	1020	100%

Table 3 shows the demographic profile of the faculty respondents that provides valuable insight on their institutional affiliation, academic rank, teaching experience, and program specialization, all of which may influence their knowledge and practices regarding educational sustainability.

In terms of school affiliation (state universities and colleges), the largest proportion of faculty respondents come from Rizal, accounting for 38% (n = 21) of the total sample. This is followed by Quezon with 32% (n = 18), and Laguna with 20% (n = 11). Meanwhile, Batangas and Cavite contributed smaller proportions of 7% (n = 4) and 4% (n = 2), respectively. This distribution shows that most faculty perspectives are drawn from Rizal and Quezon, suggesting that institutional practices and policies from these universities may have a stronger influence on the overall findings.

Regarding academic rank or position, more than half of the respondents are Instructors (52%, n = 29), followed by Assistant Professors (27%, n = 15). A smaller proportion consists of Associate Professors (14%, n = 8) and Professors

(7%, n = 4). This distribution suggests that the faculty sample is largely composed of early- to mid-career educators. Instructors and Assistant Professors are typically more engaged in direct classroom teaching and may have more frequent interaction with students, which could influence their practical implementation of educational sustainability concepts.

In terms of years of service, the largest group of respondents has 1–5 years of experience (30%, n = 17), followed closely by those with 6–10 years (27%, n = 15). Faculty with 11–15 years of service account for 20% (n = 11), while those with 21 years and above comprise 14% (n = 8). The least represented group includes those with 16–20 years of experience (9%, n = 5). This distribution indicates a relatively balanced mix of early-career and experienced educators. This may suggest that newer faculty members, who are often more exposed to recent educational trends and sustainability frameworks, could influence the study's findings toward more contemporary perspectives.

Regarding engineering program specialization, the respondents are distributed across various disciplines, with the highest representation coming from Bachelor of Science in Electronics Engineering (BSECE) at 23% (n = 13). This is followed by Bachelor of Science in Civil Engineering (BSCE), Bachelor of Science in Industrial Engineering (BSIE), and Bachelor of Science in Mechanical Engineering (BSME), each contributing 18% (n = 10). Bachelor of Science in Electrical Engineering (BSEE) accounts for 14% (n = 8), while Bachelor of Science in Computer Engineering (BSCpE) has the smallest share at 9% (n = 5). This relatively balanced distribution across engineering fields suggests that the study captures diverse disciplinary perspectives, although the slightly higher representation of BSECE may influence the results toward practices and knowledge common within that field.



Overall, the faculty respondents are predominantly affiliated with selected SUCs, hold early- to mid-level academic ranks, and possess varying levels of teaching experience across multiple engineering disciplines. The concentration of instructors and relatively younger faculty may reflect a more practice-oriented and contemporary understanding of educational sustainability, while the inclusion

of senior faculty ensures that institutional experience and long-term perspectives are also considered. These characteristics are important in interpreting the results, as they may shape both the knowledge base and the implementation of sustainability practices within engineering education.

Table 3 Distribution of Faculty-Respondents as to Demographic Profile

Category	Sub-Categories	Frequency	Percentage
School (SUC)	Rizal	21	38%
	Quezon	18	32%
	Laguan	11	20%
	Batangas	4	7%
	Cavite	2	4%
	Total	56	100%
Rank/Position	Instructor	29	52%
	Assistant Professor	15	27%
	Associate Professor	8	14%
	Professor	4	7%
	Total	56	100%
No. of Years in Service	1 - 5	17	30%
	6 – 10	15	27%
	11 – 15	11	20%
	21 and above	8	14%
	16 – 20	5	9%
	Total	56	100%
Engineering Program	BSECE	13	23%
	BSCE	10	18%
	BSIE	10	18%
	BSME	10	18%
	BSEE	8	14%
	BSCPE	5	9%
	Total	56	100%

Part II. Level of Knowledge of Students and Faculty Members on Educational Sustainability

The findings in Table 4 reveal that Engineering students demonstrate a very high level of knowledge regarding the environmental dimension of educational sustainability, as reflected by the overall average weighted mean

of 4.45. This indicates that students possess a strong understanding of environmental concepts and practices relevant to sustainability within educational institutions. Among the indicators, the highest mean score (WM = 4.72) was obtained in understanding the purpose of energy conservation practices, suggesting that students are highly aware of



practical actions such as minimizing electricity consumption. Similarly, high levels of knowledge were observed in awareness of renewable energy benefits (WM = 4.65) and proper waste segregation practices (WM = 4.58), indicating that foundational environmental concepts are well understood. Students also exhibited strong familiarity with green engineering practices (WM = 4.54) and institutional governance related to sustainability (WM = 4.48), reflecting their ability to connect environmental knowledge with their field of specialization. Moreover, awareness of school policies supporting environmental protection (WM = 4.49) further suggests that institutional efforts to promote sustainability are being effectively communicated.

However, relatively lower mean scores were observed in knowledge related to national frameworks and institutional roles. Specifically, awareness of sustainability programs under the Commission on Higher Education (CHED) framework obtained a mean of 4.15, while awareness of the roles of State Universities and Colleges (SUCs) scored 4.20, both interpreted as "High." This indicates that while students are knowledgeable in practical and conceptual aspects, there is comparatively less familiarity with broader policy frameworks and institutional responsibilities. Additionally, knowledge of the United Nations Sustainable Development Goals (SDGs), particularly SDG 12 (Responsible Consumption and Production), remains very high (WM = 4.33), suggesting that global sustainability concepts are being integrated into student learning.

While for the faculty members, the results indicate that they demonstrate a very high level of knowledge regarding the environmental dimension of educational sustainability, as reflected by the overall average weighted mean of 4.44. This suggests that faculty members possess a strong understanding of environmental concepts and are well-aware

about sustainability practices within educational institutions.

Among the indicators, the highest mean score of 4.68 was obtained in understanding the purpose of energy conservation practices on campus, showing that faculty members are highly aware of practical and everyday sustainability actions like reducing electricity consumption. This is closely followed by awareness of the benefits of renewable energy sources (WM = 4.66), reflecting strong understanding with alternative and sustainable energy solutions. Also, teachers demonstrated high knowledge of the roles of SUCs in upholding environmental awareness (WM = 4.57) and the ability to apply the practices of green engineering (WM = 4.54), emphasizing the capacity of the faculty members to relate environmental sustainability to both institutional responsibilities and to their field of specialization.

Faculty members also showed a very high level of awareness in understanding how institutional governance affects sustainability implementation (WM = 4.46) and in the practice of proper segregation of wastes (WM = 4.39). Awareness with the ways and strategies for water conservation (WM = 4.36) and understanding of institutional programs that support and protect the environment (WM = 4.30) further indicate that respondents are knowledgeable about the practical areas of sustainability.

Relatively lower mean scores were observed in knowledge related to broader frameworks, such as sustainability programs under the Commission on Higher Education (CHED) (WM = 4.25) and the United Nations Sustainable Development Goals (SDGs), particularly SDG 12 (WM = 4.27). This reveals that even if faculty members are highly knowledgeable in the application of environmental sustainability practices, there is slightly less understanding with national and global sustainability frameworks.



The findings imply that faculty members have a solid foundation in environmental sustainability knowledge, particularly in practical and discipline-related applications. However, there is a need to improve and

deepen the awareness of institutional policies and international frameworks for the enhancement of possible sustainability engagement for both local and international levels.

Table 4 Level of Educational Sustainability Knowledge of Students and Faculty Members on the Environmental Dimension

Indicators	Students (n = 1020)		Faculty Members (n = 56)	
	Weighted Mean / (Standard Deviation)	Verbal Interpretation	Weighted Mean / (Standard Deviation)	Verbal Interpretation
Knowledge about the proper implementation of waste segregation in school	4.58 (0.7083)	Very High	4.39 (0.7551)	Very High
Understanding on the purpose of energy conservation practices in the campus (e.g., turning off unused lights)	4.72 (0.5727)	Very High	4.68 (0.5430)	Very High
Awareness of the benefits of using renewable energy sources in schools	4.65 (0.6501)	Very High	4.66 (0.6682)	Very High
Familiarity with water conservation strategies used in educational institutions	4.39 (0.8277)	Very High	4.36 (0.8405)	Very High
Awareness of school polices that support environmental protection and sustainability	4.49 (0.7273)	Very High	4.30 (0.8511)	Very High
Knowledge about institutional programs promoting sustainability in the Commission on Higher Education (CHED) framework or national educational policies	4.15 (0.8949)	High	4.25 (0.8581)	Very High
Awareness on how Sustainable Development Goals SDGs (especially SDG 12 – Responsible Consumption and Production) relate to educational sustainability	4.33 (0.8324)	Very High	4.27 (0.7505)	Very High
Knowledge on how Engineering students can apply green engineering practices to protect the environment	4.54 (0.6959)	Very High	4.54 (0.6314)	Very High
Awareness about the roles of SUCs in promoting environmental awareness and sustainable practices	4.20 (0.8328)	High	4.57 (0.5987)	Very High
Understanding on how institutional governance affects the implementation of environmental sustainability programs	4.48 (0.7023)	Very High	4.46 (0.6596)	Very High
Average Mean	4.45	Very High	4.44	Very High

Legend: 1.00-1.80=Very Low 1.81-2.60=Low 2.61-3.40=Moderate 3.41-4.20=High 4.21-5.00=Very High

The findings in Table 5 indicate that Engineering students possess a very high level of knowledge regarding the social dimension of

educational sustainability, as evidenced by the overall average weighted mean of 4.58. This shows that students have a strong awareness of



the social principles that contribute to sustainable educational environments, particularly in terms of inclusivity, equity, and community engagement.

Among the indicators, the highest mean scores of 4.66 were observed in recognizing that providing equal access to education is part of social responsibility and in understanding the importance of mental health programs in fostering socially sustainable institutions. These results reveal that students consider significant value on both equity in education and student well-being as important components of sustainability.

Similarly, high levels of awareness were noted in relation to anti-bullying policies (WM = 4.61), community outreach programs (WM = 4.61), and gender-sensitive school policies (WM = 4.56), indicating that students are well-informed about institutional strategies that promote a safe, inclusive, and supportive learning environment. Knowledge of social cohesion (WM = 4.53) and equal access to learning opportunities (WM = 4.51) further show the understanding that sustainability does not only mean environmental concerns. Students also demonstrated strong awareness of the importance of interpersonal relationships and school-community partnerships, both with WM = 4.58, suggesting recognition of collaboration and stakeholder involvement as key elements of social sustainability. Additionally, the involvement of parents and stakeholders (WM = 4.49) received a very high rating, indicating partnership and linkages. These findings align with the principles of the United Nations Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education) and SDG 10 (Reduced Inequalities), which emphasize inclusive and equitable education as a cornerstone of sustainable development.

In summary, the results imply that students have a comprehensive awareness of the social dimension of sustainability. This strong foundation provides an opportunity for institutions to further translate this knowledge into active participation in programs that promote inclusivity, mental health, and community engagement.

While for the faculty members, the findings reveal that they possess a very high level of knowledge regarding the social dimension of educational sustainability with an overall average weighted mean of 4.55. This shows a strong awareness of the social principles on sustainable education, specifically in terms of equity, inclusivity, and stakeholder engagement which is similar to the ratings made by Engineering students.

Among the indicators, the highest mean score of 4.66 was recorded in recognizing that anti-bullying policies are important strategies in the promotion of social sustainability. This highlights students' strong awareness of the importance of maintaining a safe and supportive learning environment. Likewise, a high level of knowledge resulted in understanding that providing equal access to education is a key component of social responsibility (WM = 4.64).

Faculty members also demonstrated very high awareness of community outreach programs (WM = 4.59), gender-sensitive policies (WM = 4.55), mental health programs (WM = 4.55), and the promotion of healthy interpersonal relationships (WM = 4.55). These results indicate that faculty members in the SUCs recognize the many areas and nature of social sustainability, covering not only institutional policies but also their well-being and community engagements.

In addition, strong agreement was observed in understanding that socially sustainable



institutions ensure equal learning opportunities regardless of background (WM = 4.52) and involve parents and stakeholders (WM = 4.55). The role of social cohesion within the school community (WM = 4.48) and the importance of school-community partnerships (WM = 4.45) were also rated very high, illustrating the acceptance of faculty members on collaboration and collective responsibility for the achievement of educational sustainability.

The results imply that faculty members have a comprehensive and well-developed awareness of the social dimension of sustainability. This strong knowledge base provides an opportunity for educational institutions to further encourage active participation in programs that promote inclusivity, mental health, and community involvement, thereby translating knowledge into meaningful social activities.

Table 5 Level of Educational Sustainability Knowledge of Students and Faculty Members on the Social Dimension

Indicators	Students (n = 1020)		Faculty Members (n = 56)	
	Weighted Mean / (Standard Deviation)	Verbal Interpretation	Weighted Mean / (Standard Deviation)	Verbal Interpretation
Understanding that a socially sustainable institution ensures that students have equal access to learning opportunities, regardless of their background	4.51 (0.6856)	Very High	4.52 (0.7133)	Very High
Belief that social sustainability includes strengthening social cohesion within the school community	4.53 (0.6717)	Very High	4.48 (0.5718)	Very High
Awareness that providing equal access to education is part of social responsibility	4.66 (0.6298)	Very High	4.64 (0.5197)	Very High
Knowledge that anti-bullying policies are considered strategies that promote social sustainability	4.61 (0.6652)	Very High	4.66 (0.5486)	Very High
Awareness that gender-sensitive school policies support sustainability goals	4.56 (0.6996)	Very High	4.55 (0.6854)	Very High
Belief that mental health programs help create socially sustainable educational institution	4.66 (0.6231)	Very High	4.55 (0.6006)	Very High
Knowledge that academic institutions promoting healthy interpersonal relationships help achieve social sustainability	4.58 (0.6578)	Very High	4.55 (0.6301)	Very High
Understanding that social sustainability involves strengthening school-community partnerships	4.58 (0.6631)	Very High	4.45 (0.6854)	Very High
Awareness that community outreach programs can support social sustainability initiatives in education	4.61 (0.6508)	Very High	4.59 (0.6260)	Very High
Belief that campuses involving parents and stakeholders show social sustainability	4.49 (0.7024)	Very High	4.55 (0.6301)	Very High
Average Mean	4.58	Very High	4.55	Very High



Legend: 1.00-1.80=Very Low 1.81-2.60=Low 2.61-3.40=Moderate 3.41-4.20=High 4.21-5.00=Very High

The findings in Table 6 reveal that Engineering students demonstrate a very high level of knowledge regarding the economic dimension of educational sustainability, as reflected by the overall average weighted mean of 4.57. This suggests that students possess a strong understanding of how financial practices, resource management, and long-term planning contribute to the sustainability of educational institutions.

Among the indicators, the highest mean scores of both 4.61 were observed in recognizing that energy-efficient technologies contribute to long-term cost savings and that financial transparency is essential for achieving economic sustainability. These findings highlight students' awareness of both operational efficiency and accountability as key components of sustainable institutional management.

Similarly, high levels of knowledge were evident in understanding that conserving resources (WM = 4.59) and practicing efficient waste management such as recycling (WM = 4.59) contribute to economic sustainability. The recognition that minimizing unnecessary expenditures (WM = 4.59) and implementing long-term planning strategies (WM = 4.57) further reflects students' ability to relate sustainability to practical financial decision-making within institutions.

Students also showed strong agreement that cost-effective learning policies (WM = 4.55), alignment of spending with institutional priorities (WM = 4.54), and the use of digital materials to reduce printing costs (WM = 4.52) are essential strategies in promoting economic sustainability. Additionally, the understanding that institutions must maintain operations

without compromising future resources (WM = 4.53) demonstrates awareness of intergenerational responsibility, a core principle of sustainable development.

These findings are consistent with the framework of the United Nations Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth) and SDG 12 (Responsible Consumption and Production), which emphasize efficient resource utilization, financial responsibility, and sustainable economic practices.

The results imply that students have a clear and well-developed awareness on the economic aspects of sustainability. This strong knowledge base provides a solid foundation for integrating cost-efficient and resource-conscious practices into both academic and institutional contexts.

As compared to the results from the students, the findings indicate that faculty members possess a very high level of knowledge regarding the economic dimension of educational sustainability, as reflected by the overall average weighted mean of 4.58. This suggests that faculty members have a strong understanding of how financial management, resource efficiency, and long-term planning contribute to the sustainability of educational institutions.

Considering other indicators, the highest mean score (4.77) was obtained in the understanding that energy-efficient technologies contribute to long-term cost savings for institutions. This reveals faculty members' strong awareness of the economic benefits of sustainable technologies and shows their recognition of the practical relationship between sustainability and financial efficiency. In addition, very high



mean scores were observed in understanding that cutting unnecessary expenditures can improve economic sustainability (WM = 4.66), and that long-term planning such as facility upgrades and energy management supports sustainability (WM = 4.63). The same mean (4.63) was also recorded for aligning institutional spending with organizational priorities, emphasizing the importance of strategic financial decision-making.

Faculty members also showed strong awareness of financial transparency (WM = 4.61) and cost-effective learning policies (WM = 4.55), indicating that accountability and efficient policy-making are well understood as essential elements of economic sustainability. Furthermore, respondents recognized that resource conservation (WM = 4.45) and efficient waste management practices such as recycling (WM = 4.54) contribute to institutional financial stability.

Knowledge on the use of digital materials to minimize printing costs and maintaining operations without compromising resources

for future generations also received very high ratings of 4.50. These findings reveal the understanding of faculty members in sustainability as both an immediate concern and a long-term responsibility.

These results are consistent with the principles of the United Nations Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth) and SDG 12 (Responsible Consumption and Production), which promote efficient use of resources, responsible financial management, and sustainable economic practices.

The findings also imply that faculty members possess a comprehensive understanding of the economic dimension of educational sustainability. Their strong understanding of cost-saving practices, and resource efficiency provides a solid foundation for applying sustainability principles in both academic and future professional endeavors.

Table 6 Level of Educational Sustainability Knowledge of Students and Faculty Members on the Economic Dimension

Indicators	Students (n = 1020)		Faculty Members (n = 56)	
	Weighted Mean / (Standard Deviation)	Verbal Interpretation	Weighted Mean / (Standard Deviation)	Verbal Interpretation
Understanding that financially sustainable school can maintain its operations without sacrificing the available resources for future generations	4.53 (0.6676)	Very High	4.50 (0.6325)	Very High
Knowledge that economic sustainability includes making learning policies cost effective	4.55 (0.6426)	Very High	4.55 (0.6301)	Very High
Awareness that conserving resources can improve the economic sustainability of academic institutions	4.59 (0.6199)	Very High	4.45 (0.6854)	Very High
Understanding that economic sustainability can be achieved by	4.59 (0.6385)	Very High	4.54 (0.6596)	Very High



recycling waste and using resources efficiently				
Knowledge that energy-efficient technologies contribute to long-term cost savings of the institutions	4.61 (0.6309)	Very High	4.77 (0.4260)	Very High
Knowledge that by minimizing the use of printed copies and utilizing digital materials would mean enhancement in economic sustainability	4.52 (0.6966)	Very High	4.50 (0.7862)	Very High
Awareness that long-term planning such as facility upgrades and energy management supports economic sustainability	4.57 (0.6541)	Very High	4.63 (0.6198)	Very High
Awareness that economic sustainability requires aligning spending with institutional priorities.	4.54 (0.6641)	Very High	4.63 (0.6484)	Very High
Knowledge that institutions must be financially transparent to achieve economic sustainability	4.61 (0.6355)	Very High	4.61 (0.5933)	Very High
Belief that cutting unnecessary expenditures can improve economic sustainability.	4.59 (0.6518)	Very High	4.66 (0.5486)	Very High
Average Mean	4.57	Very High	4.58	Very High

Legend: 1.00-1.80=Very Low 1.81-2.60=Low 2.61-3.40=Moderate 3.41-4.20=High 4.21-5.00=Very High

The findings in Table 7 discloses that Engineering students possess a very high level of knowledge regarding institutional management in the context of educational sustainability, as reflected by the overall average weighted mean of 4.55. This shows that students are highly aware of how governance, policies, and organizational structures lead to the successful implementation of sustainability initiatives within the academe.

Among the indicators, the highest mean score (4.62) was observed in the understanding that sustainability should be promoted across all aspects of the institution. This highlights a strong appreciation of sustainability as an institution-wide responsibility rather than a standalone initiative. Similarly, students demonstrated a high level of awareness that

sustainability must be integrated into the institution's vision and mission (WM = 4.58), reinforcing the importance of strategic alignment in achieving long-term sustainability goals.

Students also showed strong knowledge in recognizing the need for regular updates to address sustainability challenges (WM = 4.57), as well as understanding the importance of clearly defined institutional roles (WM = 4.55). These findings emphasize the role of adaptive governance and structured leadership in sustaining effective implementation.

Furthermore, high mean scores were recorded in areas such as sustainable procurement practices (4.54), partnerships for long-term development (4.54), risk management (4.54), and compliance with sustainability laws and



standards (4.54). These results indicate that students are well-informed about the management and administrative responsibilities involved in institutional sustainability.

Awareness of sustainability integration across curriculum, research, and community extension (WM = 4.52) also reflects an understanding of the multidimensional role of higher education institutions in promoting sustainability. Additionally, alignment of institutional policies with global frameworks (WM = 4.45), such as those promoted by the United Nations Educational, Scientific and Cultural Organization and the United Nations Sustainable Development Goals (SDGs), further demonstrates students' familiarity with international standards guiding sustainability initiatives.

The findings indicate that students have a clear understanding of institutional management as a critical dimension of educational sustainability. This strong awareness provides a solid foundation for promoting governance-oriented competencies among engineering students. However, continuous exposure to actual institutional practices, implementation of programs and policies, and decision-making processes can further promote their ability to translate knowledge into leadership and management roles in sustainability initiatives.

While in the case of faculty members, the findings indicate that they demonstrate a very high level of educational sustainability knowledge in terms of institutional management, as reflected by the overall

weighted mean of 4.53. This reveals that respondents are highly aware of the role of governance and institutional policies in promoting sustainability within educational settings. Among the indicators, the highest-rated items include the integration of sustainability into the institution's vision and mission (WM = 4.59) and the promotion of sustainability across all institutional aspects (WM = 4.59), emphasizing strong recognition of sustainability as a core institutional priority. Additionally, the respondents show a strong understanding of the importance of clearly defined roles in governance and the inclusion of risk management in institutional management, both with WM = 4.57.

Faculty members also acknowledge the importance of aligning institutional policies with national and international sustainability frameworks, such as those promoted by UNESCO and the Sustainable Development Goals, with a high weighted mean of 4.52. This indicates awareness of global standards in sustainability practices. The relatively lower mean (but still very high) for sustainable procurement practices (WM = 4.41) suggests a slightly lesser familiarity with operational aspects of sustainability.

The consistently low standard deviation values (ranging from 0.6283 to 0.7135) reveal that responses are closely clustered around the mean, reflecting a high level of agreement among respondents. This implies that educational sustainability knowledge on institutional management is not only high but also uniformly shared across the group.



Table 7 Level of Educational Sustainability Knowledge of Students and Faculty Members on the Institutional Management Dimension

Indicators	Students (n = 1020)		Faculty Members (n = 56)	
	Weighted Mean / (Standard Deviation)	Verbal Interpretation	Weighted Mean / (Standard Deviation)	Verbal Interpretation
Awareness that educational sustainability requires schools to align their institutional policies with national and international sustainability framework (e.g., UNESCO, SDGs).	4.45 0.7243	Very High	4.52 (0.6322)	Very High
Understanding that institutional guidelines must provide clearly defined roles for administration, faculty, and committees	4.55 0.6439	Very High	4.57 (0.6283)	Very High
Awareness that sustainable procurement practices (e.g. eco-friendly materials, cost efficient resources) are part of governance responsibilities	4.54 0.6579	Very High	4.41 (0.6544)	Very High
Awareness that partnership help institution achieve long-term sustainable development goals	4.54 0.6682	Very High	4.50 (0.7135)	Very High
Understanding that institutional management includes risk management	4.54 0.6743	Very High	4.57 (0.6283)	Very High
Knowledge that governance structures must ensure compliance to sustainable laws and standards	4.54 0.6459	Very High	4.48 (0.6322)	Very High
Awareness that regular updates are needed to respond sustainability challenges and issues	4.57 0.6560	Very High	4.52 (0.7133)	Very High
Knowledge that governance must ensure that sustainability is included with the vision and mission of the institution	4.58 0.6433	Very High	4.59 (0.7078)	Very High
Awareness that there should be sustainability integration with the curriculum, research and community extension projects	4.52 0.6649	Very High	4.54 (0.7126)	Very High
Knowledge that sustainability should be promoted in all aspects of the institution	4.62 0.6275	Very High	4.59 (0.6544)	Very High
Average Mean	4.55	Very High	4.53	Very High



Legend: 1.00-1.80=Very Low 1.81-2.60=Low 2.61-3.40=Moderate 3.41-4.20=High 4.21-5.00=Very High

Part III. Level of Practices of Students and Faculty Members on Educational Sustainability

Table 8 reveals that Engineering students exhibit a very high level of educational sustainability practices in terms of the environmental dimension, as shown by the overall weighted mean of 4.45. This shows that state universities are actively implementing environmentally responsible initiatives and that these efforts are highly recognized by the students. Among the indicators, the highest-rated practices include maintaining green spaces such as trees, gardens, and open areas (WM = 4.52) and implementing energy-saving policies like turning off lights and air-conditioning units when not in use (WM = 4.51). These suggest that institutions do not only prioritize environmental conservation but also resource efficiency within the schools.

In addition, strong agreement is observed in practices such as proper disposal of hazardous waste (WM = 4.49), integration of environmental sustainability into the curriculum (WM = 4.48), and encouragement of student-led environmental projects (WM = 4.46). The implementation of 3Rs (Reduce, Reuse, Recycle) programs and biodiversity protection initiatives (both with WM = 4.45) further reflects a comprehensive approach to sustainability. Activities aligned with global environmental movements, such as those promoted during Earth Day, also received very high recognition (WM = 4.44), highlighting institutional participation in awareness-driven initiatives. Although still interpreted as very high, slightly lower mean scores were observed in conducting seminars and trainings on sustainability (WM = 4.34) and tree planting or reforestation activities (WM = 4.36), providing possible areas for further enhancement in other

community extension activities. The standard deviation values, ranging from 0.7009 to 0.8522, indicate a relatively consistent level of agreement among respondents.

The findings show that environmental sustainability practices are well-established and consistently implemented across the institution, leading to the promotion of a more inclusive ecological awareness and responsible environmental initiatives.

While the findings from the faculty members indicate that they perceive a very high level of educational sustainability practices in the environmental dimension, as reflected by the overall weighted mean of 4.21. Among the indicators, the highest-rated practices include the implementation of energy-saving policies such as turning off lights and air-conditioning units when not in use (WM = 4.48) and the organization of environmental awareness activities (WM = 4.46), including events aligned with global initiatives like Earth Day. These findings highlight the institutions' strong commitment to promoting environmental awareness and resource conservation. Additionally, the encouragement of student-led environmental projects (WM = 4.29) and the conduct of tree planting and reforestation activities (WM = 4.27) indicate active engagement of the academic community in sustainability efforts. The conduct of seminars, workshops, and trainings (WM = 4.23) further supports the development of environmental knowledge and awareness among stakeholders.

Although several indicators received comparatively lower mean scores, they are still interpreted as high. These include the maintenance of green spaces (WM = 3.98), implementation of 3Rs programs (WM = 4.04),



integration of environmental sustainability into the curriculum (WM = 4.02), and proper disposal of hazardous wastes (WM = 4.09). These results suggest that while sustainability policies and programs exist, the implementation may not be as consistently experienced across respondents. Also, the relatively higher standard deviation values (ranging from 0.7126 to 0.9815) indicate greater variability in responses, implying differences in awareness or practice across departments or individuals.

Overall, the results imply that environmental sustainability practices are strongly present in the state universities and colleges in CALABARZON, particularly in awareness and behavioral initiatives, while highlighting opportunities to strengthen continuity in operational practices such as waste management, curriculum integration, and environmental resource maintenance.

Table 8 Level of Educational Sustainability Practices of Students and Faculty Members on the Environmental Dimension

Indicators	Students (n = 1020)		Faculty Members (n = 56)	
	Weighted Mean / (Standard Deviation)	Verbal Interpretation	Weighted Mean / (Standard Deviation)	Verbal Interpretation
Implementing 3Rs (Reduce, Reuse, Recycle) programs	4.45 (0.7875)	Very High	4.04 (0.9335)	High
Organizing environmental awareness activities (e.g., Earth Day, Clean-Up drives)	4.44 (0.7602)	Very High	4.46 (0.7126)	Very High
Conducting seminars, workshops, and trainings about sustainability	4.34 (0.8107)	Very High	4.23 (0.8737)	Very High
Carrying out tree planting and other campus reforestation activities	4.36 (0.8522)	Very High	4.27 (0.9242)	Very High
Providing policies for classrooms and other offices for turning off lights and air-conditioning units when not in use	4.51 (0.7446)	Very High	4.48 (0.7133)	Very High
Maintaining green spaces for trees, gardens, and open areas	4.52 (0.7135)	Very High	3.98 (0.9815)	High
Incorporating environmental sustainability in the curriculum	4.48 (0.7009)	Very High	4.02 (0.9044)	High
Protecting existing wildlife and campus biodiversity	4.45 (0.7376)	Very High	4.20 (0.9423)	High
Encouraging student-led projects related to environmental solutions	4.46 (0.7354)	Very High	4.29 (0.8026)	Very High
Ensuring proper disposal of laboratory chemicals and other hazardous wastes	4.49 (0.7286)	Very High	4.09 (0.9587)	High
Average Mean	4.45	Very High	4.21	Very High



Legend: 1.00-1.80=Very Low 1.81-2.60=Low
2.61-3.40=Moderate 3.41-4.20=High 4.21-5.00=Very High

The findings in Table 9 indicate that Engineering students have a very high level of educational sustainability practices in the social dimension, as reflected by the overall weighted mean of 4.40. This shows that the schools actively promote inclusive, equitable, and supportive social practices that contribute to a holistic learning environment. The highest-rated indicator is the provision of equal learning opportunities regardless of culture, race, and gender (WM = 4.60), highlighting the institution's strong commitment to inclusivity and diversity. This is further supported by the promotion of equality in programs and services (WM = 4.51), reinforcing the institution's dedication to fair and accessible education for all.

Additionally, respondents recognize their institution's efforts in fostering a supportive community, as seen in promoting mutual encouragement among students (WM = 4.43) and encouraging student involvement in addressing social issues (WM = 4.39). The establishment of linkages with local communities (WM = 4.39) and the use of culturally responsive teaching strategies (WM = 4.36) also reflect alignment with broader social sustainability goals advocated by global frameworks such as the Sustainable Development Goals. Although comparatively lower (but still very high) mean scores were observed in areas related to student well-being and support services, including support for physical, emotional, and mental health (WM = 4.26) and the provision of counseling services (WM = 4.31). These results suggest potential areas for improvement, specifically in strengthening student support systems and wellness initiatives. The standard deviation values, ranging from 0.6385 to 0.8969, indicate

a generally consistent level of agreement among respondents.

The results indicate that the institutions demonstrate strong social sustainability practices, particularly in inclusivity and community engagement, while still offering opportunities to further enhance the welfare of the students including the possible mechanism support.

In the case of faculty member, the findings reveal that they perceive a very high level of educational sustainability practices in the social dimension, as reflected by the overall weighted mean of 4.42. This indicates that the institutions effectively foster an inclusive and supportive learning environment that is consistent with the principles of social sustainability. The highest-rated indicator is the provision of equal learning opportunities regardless of culture, race, and gender (WM = 4.61), demonstrating a strong institutional commitment to inclusivity and non-discrimination. This is further supported by high ratings in promoting student well-being (WM = 4.46) and providing counseling services (WM = 4.43), highlighting the institutions' focus on holistic student development.

In addition, the institutions' engagement with the broader community is evident through its partnerships with local communities (WM = 4.43) and the conduct of community outreach programs (WM = 4.39). The use of culturally responsive teaching strategies (WM = 4.34) and the encouragement of students to participate in solving social issues (WM = 4.32) also reflect the integration of social responsibility into the academic experience. These practices are aligned with the objectives of the Sustainable Development Goals, particularly those related to quality education, reduced inequalities, and sustainable communities.



The relatively low standard deviation values (ranging from 0.5618 to 0.8966) indicate a consistent level of agreement among respondents, suggesting that these social sustainability practices are widely experienced across the academic institutions. Although all indicators fall under the “Very High” category, slightly lower ratings in student engagement in solving social issues (WM = 4.32) may suggest an opportunity to further promote

participatory and leadership opportunities for students.

The results indicate that social sustainability practices are strongly embedded in the institution, particularly in promoting equality, well-being, and community engagement, with minor areas for enhancement in student-driven social initiatives.

Table 9 Level of Educational Sustainability Practices of Students and Faculty Members on the Social Dimension

Indicators	Students (n = 1020)		Faculty Members (n = 56)	
	Weighted Mean / (Standard Deviation)	Verbal Interpretation	Weighted Mean / (Standard Deviation)	Verbal Interpretation
Providing equal learning opportunities for all students regardless of culture, race, and gender	4.60 (0.6385)	Very High	4.61 (0.5618)	Very High
Promoting equality in its programs and services being offered	4.51 (0.7205)	Very High	4.41 (0.6544)	Very High
Regularly conducting community outreach programs	4.33 (0.7941)	Very High	4.39 (0.7551)	Very High
Building partnerships with local communities to address social needs and issues	4.39 (0.7589)	Very High	4.43 (0.7350)	Very High
Using culturally responsive teaching strategies	4.36 (0.7811)	Very High	4.34 (0.7205)	Very High
Supporting the students’ physical, emotional, and mental well-being	4.26 (0.8969)	Very High	4.46 (0.7377)	Very High
Providing counseling services for all students	4.31 (0.8643)	Very High	4.43 (0.7594)	Very High
Properly implementing anti-bullying and anti-harassment policies	4.37 (0.8210)	Very High	4.41 (0.7078)	Very High
Encouraging students to help solve social issues	4.39 (0.8022)	Very High	4.32 (0.8966)	Very High
Fostering a culture of mutual support and encouragement among students	4.43 (0.7580)	Very High	4.41 (0.7078)	Very High
Average Mean	4.40	Very High	4.42	Very High

Legend: 1.00-1.80=Very Low 1.81-2.60=Low 2.61-3.40=Moderate 3.41-4.20=High 4.21-5.00=Very High



Table 10 reveals that Engineering students perceive a very high level of educational sustainability practices in the economic dimension, as shown by the overall weighted mean of 4.23. This suggests that institutions are effectively implementing cost-efficient and financially sustainable practices that support educational goals. Among the indicators, the highest-rated practice is the provision of scholarship grants to qualified students (WM = 4.44), highlighting the institutions' strong commitment to financial accessibility and support. This is followed by the encouragement of eco-friendly materials and the utilization of resource-efficient technologies (both with WM = 4.34), indicating alignment between economic efficiency and environmental responsibility. Additionally, practices such as supporting flexible and blended learning (WM = 4.29) and establishing industry partnerships (WM = 4.27) received very high ratings, reflecting the institutions' adaptability and collaboration with external stakeholders to enhance sustainability. These efforts are consistent with the broader goals of the Sustainable Development Goals, particularly in promoting quality education, and sustainable economic growth.

Some indicators, while still rated as high, received comparatively lower mean scores. These include minimizing paper and printing (WM = 3.93), efficient classroom scheduling (WM = 4.13), and offering short-term training programs (WM = 4.14). These results suggest areas where institutions may further improve operational efficiency and resource management.

The findings demonstrate that economic sustainability practices are well-established within the SUCs, particularly in areas related to financial support, technological efficiency, and external partnerships.

Similarly, the findings from the faculty members indicate a high level of educational

sustainability practices in the economic dimension, as reflected by the overall weighted mean of 4.11. This suggests that while the institutions demonstrate considerable efforts in promoting economic sustainability, these practices are comparatively less pronounced than in other dimensions. The highest-rated indicators include the provision of scholarship grants to qualified students (WM = 4.48) and support for flexible and blended learning (WM = 4.41), both interpreted as very high. These results highlight the institutions' strong commitment to financial accessibility and cost-efficient learning modalities. Additionally, practices such as establishing industry partnerships and linkages (WM = 4.18), encouraging the use of eco-friendly materials (WM = 4.11), and utilizing resource-efficient technologies (WM = 4.11) reflect efforts to align economic sustainability with innovation and environmental responsibility.

However, several indicators received relatively lower mean scores, including minimizing paper and printing (WM = 3.79), offering short-term training programs (WM = 3.93), and providing training related to sustainable financial practices (WM = 3.96). These findings suggest areas where the institutions may further strengthen cost-reduction strategies, revenue-generating initiatives, and financial literacy programs.

Moreover, the relatively higher standard deviation values (ranging from 0.7133 to 1.1096) indicate greater variability in responses, showing inconsistencies in the implementation or understanding of economic sustainability practices across institutions. Despite these variations, the results still demonstrate that the institutions are making meaningful progress in the integration of economic sustainability into its operations.

The findings suggest that while economic sustainability practices are present and

functional within the institutions, there is still a need for further enhancement in operational efficiency, financial training, and resource

management to achieve a more consistent and comprehensive implementation.

Table 10 Level of Educational Sustainability Practices of Students and Faculty Members on the Economic Dimension

Indicators	Students (n = 1020)		Faculty Members (n = 56)	
	Weighted Mean / (Standard Deviation)	Verbal Interpretation	Weighted Mean / (Standard Deviation)	Verbal Interpretation
Scheduling classrooms assignment efficiently	4.13 (0.9453)	High	4.09 (0.7693)	High
Utilizing buildings and energy-efficient equipment	4.20 (0.8711)	High	4.02 (0.9044)	High
Establishing industry partnerships	4.27 (0.8103)	Very High	4.18 (0.8551)	High
Offering short term-training programs	4.14 (0.8844)	High	3.93 (1.1096)	High
Minimizing paper and printing	3.93 (1.0425)	High	3.79 (1.0907)	High
Supporting flexible and blended learning	4.29 (0.8732)	Very High	4.41 (0.7574)	Very High
Providing scholarship grants to qualified students	4.44 (0.7811)	Very High	4.48 (0.7133)	Very High
Encouraging the students to utilize eco-friendly materials for their projects and activities	4.34 (0.8203)	Very High	4.11 (0.8671)	High
Utilizing resource-efficient technologies	4.34 (0.7877)	Very High	4.11 (0.8459)	High
Providing trainings related to sustainable financial practices	4.26 (0.8531)	Very High	3.96 (1.0263)	High
Average Mean	4.23	Very High	4.11	High

Legend: 1.00-1.80=Very Low 1.81-2.60=Low 2.61-3.40=Moderate 3.41-4.20=High 4.21-5.00=Very High

The findings in Table 11 reveal that Engineering students perceive a very high level of educational sustainability practices in terms of institutional management, as indicated by the overall weighted mean of 4.32. This suggests that the SUCs effectively integrate sustainability into its leadership and operational policies. Among the indicators, the highest-rated practice is the encouragement of innovation and responsible practices for

sustainable governance (WM = 4.42), highlighting the institutions' proactive approach to continuous improvement and adaptive management. This is followed by the presence of clear sustainability policies (WM = 4.38) and leadership that models sustainable practices (WM = 4.35), reflecting strong administrative commitment. Additionally, respondents acknowledge their institution's efforts in promoting transparency and accountability (WM = 4.35), ensuring ethical



procurement practices (WM = 4.34), and integrating sustainability into the curriculum (WM = 4.33). The establishment of committees or offices dedicated to monitoring sustainability initiatives (WM = 4.30) and the prioritization of sustainability by university leaders (WM = 4.28) further show structured governance aligned with sustainability principles. These practices are consistent with international standards promoted by organizations such as UNESCO and the Sustainable Development Goals, which emphasize institutional accountability and sustainable governance in education.

However, the relatively lower mean score for the use of monitoring tools such as dashboards for tracking sustainability-related activities (WM = 4.17) suggests a potential area for improvement, particularly in strengthening data-driven decision-making and performance evaluation systems. The standard deviation values, ranging from 0.7439 to 0.9027, indicate a generally consistent level of agreement among respondents.

The results imply that institutional management practices strongly support educational sustainability, with well-established leadership, policies, and governance mechanisms, while offering opportunities to further enhance evaluation and monitoring mechanisms and technological support for sustainability assessment.

Similarly, the findings indicate that faculty members perceive a high level of educational sustainability practices in terms of institutional management, as reflected by the overall weighted mean of 4.06. This suggests that while sustainability is integrated into the institutions' governance and leadership, its implementation is somewhat less consistent compared to other dimensions. The highest-rated indicator is the university leadership's modeling of sustainable policies and practices (WM = 4.27), followed by

the presence of clear sustainability policies (WM = 4.21). These results highlight that the institutions demonstrate strong leadership commitment and policy development.

In addition, respondents recognize their institution's efforts in the promotion of transparency and accountability (WM = 4.20) and encouraging innovation and responsible governance practices (WM = 4.11). However, several indicators received comparatively lower mean scores, including the presence of a sustainability committee or office (WM = 3.91) and the use of monitoring tools such as dashboards for tracking sustainability initiatives (WM = 3.86). These findings suggest gaps in the structural and monitoring mechanisms necessary for effective implementation and evaluation of sustainability efforts.

Also, other operational aspects such as the use of energy-efficient technologies (WM = 3.98), ethical procurement practices (WM = 3.96), and integration of sustainability into the curriculum (WM = 4.00) were rated as high but not very high, indicating opportunities for improvement in aligning institutional operations with sustainability goals. The relatively higher standard deviation values (ranging from 0.7505 to 1.1199) reflect variability in responses, suggesting inconsistencies in awareness or implementation across different areas of the institution.

These practices are still aligned with global sustainability frameworks such as those promoted by UNESCO and the Sustainable Development Goals, particularly in emphasizing accountable governance and sustainable institutional systems.

The results imply that institutional management practices for sustainability are present but require strengthening, particularly



in terms of formal structures, monitoring systems, and consistent implementation across the institution.

Table 11 Level of Educational Sustainability Practices of Students and Faculty Members on the Institutional Management Dimension

Indicators	Students (n = 1020)		Faculty Members (n = 56)	
	Weighted Mean / (Standard Deviation)	Verbal Interpretation	Weighted Mean / (Standard Deviation)	Verbal Interpretation
Modeling sustainable policies and practices in school operations	4.35 (0.7560)	Very High	4.27 (0.7505)	Very High
Regularly prioritizing sustainability promotion	4.28 (0.7954)	Very High	4.13 (0.8541)	High
Having a committee or office that monitors and oversees sustainability initiatives	4.30 (0.7886)	Very High	3.91 (1.0318)	High
Having clear policies on educational sustainability (e.g., environmental, social, economic)	4.38 (0.7521)	Very High	4.21 (0.8467)	Very High
Providing monitoring tasks like dashboards for tracking sustainability related activities	4.17 (0.9027)	High	3.86 (1.0345)	High
Incorporating environmental sustainability in the curriculum	4.33 (0.7712)	Very High	4.00 (0.9342)	High
Using energy-efficient technologies in its facilities and infrastructure	4.27 (0.8278)	Very High	3.98 (1.1199)	High
Using responsible and ethically sourced materials in the procurement policies	4.34 (0.7714)	Very High	3.96 (1.0263)	High
Promoting a culture of transparency and accountability in its institutional management	4.35 (0.7759)	Very High	4.20 (0.9614)	High
Encouraging innovation and responsible practices for sustainable governance	4.42 (0.7439)	Very High	4.11 (0.8879)	High
Average Mean	4.32	Very High	4.06	High

Legend: 1.00-1.80=Very Low 1.81-2.60=Low 2.61-3.40=Moderate 3.41-4.20=High 4.21-5.00=Very High

Part IV. Tests of Significant Difference and Relationship

The results show that both students and faculty demonstrate a very high level of educational sustainability knowledge and practices, as

reflected by their closely similar mean scores. Students obtained a mean of 4.54, while faculty recorded a slightly lower mean of 4.52, indicating that both groups share a strong and consistent perception of sustainability practices within the institution. The minimal difference



between the two means (0.02) suggests that there is no substantial gap in how students and faculty perceive educational sustainability, reflecting alignment in awareness and experiences across these groups.

In terms of variability, both groups exhibit relatively similar standard deviations (students: 0.66; faculty: 0.65), indicating a comparable spread of responses. However, the mean standard error for students (0.0207) is much smaller than that of faculty (0.0882), which can be attributed to the significantly larger sample size of students ($n = 1020$) compared to faculty ($n = 56$). This implies that the students' mean is a more precise estimate of the population mean, while the faculty mean, although still reliable, has slightly greater variability due to the smaller sample size.

The independent samples t-test showed that there is no significant difference between the

knowledge and practices of students and faculty members ($t = 0.22$, $df = 1074$, $p = 0.826$). Since the computed p-value is greater than the 0.05 level of significance, the null hypothesis was not rejected. This indicates that both students and faculty members have comparable levels of knowledge and practices regarding educational sustainability.

Overall, the findings suggest a high level of consistency and agreement between students and faculty regarding educational sustainability in the institution. This alignment indicates that sustainability initiatives, likely guided by frameworks such as the Sustainable Development Goals, are effectively communicated and experienced across different stakeholders within the academic community.

Table 12 Significant Difference Between the Educational Sustainability Knowledge and Practices of Students and Faculty Members

Group	Sample Size	Mean	Std. Dev.	t-value	df	p-value	Decision	Interpretation
Students	1020	4.54	0.66	0.22	61	0.826	Fail to Reject H_0	No Significant Difference
Faculty	56	4.52	0.65					

The relationship between educational sustainability knowledge and practices of students and faculty members was examined using the Pearson correlation coefficient. The analysis revealed a strong positive correlation ($r = 0.680$), indicating that higher levels of knowledge are associated with higher levels of sustainability practices.

To determine the significance of this relationship, the computed correlation coefficient was subjected to a t-test, yielding a value of approximately $t = 29.60$ with 1018 degrees of freedom. This resulted in a p-value less than 0.001, which is significantly lower than the 0.05 level of significance. Thus, the null hypothesis stating that there is no significant relationship between knowledge and practices

is rejected. This implies that knowledge is a significant predictor of sustainability practices among respondents.

Furthermore, the coefficient of determination ($r^2 = 0.4624$) indicates that approximately 46.24% of the variation in sustainability practices can be explained by knowledge. This suggests that while other factors may also influence practices, knowledge plays a substantial and meaningful role.

These findings highlight the importance of strengthening sustainability education, as increased knowledge appears to translate into improved practical application. Even in the absence of significant differences between students and faculty in earlier analyses, the

presence of a strong and significant relationship underscores the critical role of knowledge in driving sustainable behavior.

Table 13 Significant Relationships Between Educational Sustainability Knowledge and Practices of Students and Faculty Members

r = value	r ² (%)	p-value	Interpretation	Decision
0.680	46.24%	< 0.001	Strong Positive	Reject H ₀

Part V. Problems Encountered by Engineering Students and Faculty Members on Educational Sustainability

The findings on the problems encountered by the Engineering students on educational sustainability reveal an overall weighted mean of 3.33, interpreted as moderate, indicating that while sustainability initiatives are present in SUCs in CALABARZON, several challenges continue to hinder their full implementation. Among the identified issues, insufficient funding for programs and initiatives (WM = 3.65) emerged as the most prominent concern and was rated high, suggesting that financial constraints significantly limit the development, expansion, and sustainability of institutional programs. This implies that even when institutions are willing to adopt sustainable practices, limited financial resources restrict their capacity to invest in necessary infrastructure, training, and long-term initiatives.

Other indicators were rated at a moderate level, pointing to systemic and operational gaps. The lack of teaching materials (WM = 3.38), low awareness and interest in sustainability issues (WM = 3.32), and limited integration of sustainability in the curriculum (WM = 3.28) suggest that sustainability is not yet fully embedded in the academic framework. This may result in students acquiring only theoretical knowledge and understanding, rather than developing practical competencies needed to address real-world sustainability issues and challenges. Additionally,

institutional concerns such as the absence of clear policies (WM = 3.25) and lack of defined assessment indicators (WM = 3.30) indicate weak governance structures, which can lead to inconsistent implementation and difficulty in evaluating program effectiveness.

Furthermore, challenges related to infrastructure and technology, including insufficient eco-friendly facilities (WM = 3.31) and the high cost of green technologies (WM = 3.30), highlight the resource-intensive nature of sustainability efforts. These hindrances may discourage institutions from fully adopting sustainable systems despite recognizing their importance. Social and behavioral factors also play a role, as reflected in limited community involvement (WM = 3.32) and resistance to sustainable practices (WM = 3.22), indicating that stakeholder engagement and cultural readiness remain areas of concern.

In addition, [Sterling \(2010\)](#) emphasized that transforming education toward sustainability requires substantial institutional investment, including funding for curriculum redesign, instructional materials, and capacity-building initiatives. A lack of such investment can hinder the successful integration of sustainability concepts into teaching and learning processes.

Overall, the moderate level of these problems as perceived by Engineering students suggests that SUCs are in a transitional phase of sustainability implementation, where awareness and initial efforts exist but are not



yet fully implemented. Addressing these challenges requires a comprehensive approach that includes increased funding support, stronger policy frameworks, improved curriculum integration, and enhanced stakeholder participation. Strengthening these areas will enable SUCs to move beyond partial implementation toward a more consistent and effective practice of educational sustainability. While on the problems as perceived by the faculty members, the results indicate that the overall problems encountered in educational sustainability obtained an average weighted mean of 3.38, interpreted as moderate, suggesting that while sustainability initiatives are being implemented in SUCs in CALABARZON, several constraints continue to affect their effectiveness and consistency. Notably, four indicators were rated high, emphasizing more pressing institutional challenges. The most critical issue identified is insufficient funding for programs and initiatives (WM = 3.82), which underscores the central role of financial resources in sustaining environmental programs, faculty training, and infrastructure development. This implies that with insufficient funding, sustainability efforts may remain fragmented, short-term, or ambitious rather than transformative.

Closely following are concerns related to insufficient eco-friendly facilities (WM = 3.50), lack of clear indicators for assessing sustainability (WM = 3.45), and absence of clear institutional policies (WM = 3.41), all interpreted as high. These findings point to structural and governance-related limitations within institutions. The lack of facilities suggests that schools may struggle to translate sustainability concepts into actual practice, limiting students' experiential learning opportunities. Meanwhile, the absence of clear indicators and policies reflects weak institutional direction, making it difficult to standardize implementation, monitor progress, and ensure accountability. Together, these

results imply that sustainability in SUCs is not yet fully institutionalized and may vary significantly across programs and campuses.

The remaining indicators were rated as moderate but still reveal important gaps. Issues such as lack of awareness and interest (WM = 3.32), resistance to sustainable practices (WM = 3.30), and the high cost of green technologies (WM = 3.30) highlight behavioral and economic barriers. These suggest that even when sustainability initiatives are introduced, their success may be limited by stakeholder attitudes and the financial burden of adopting environmentally friendly technologies. Similarly, academic-related concerns, including lack of teaching materials (WM = 3.29) and limited integration in the curriculum (WM = 3.16), indicate that sustainability education is not yet deeply embedded in instructional design. This may result in students having limited exposure to sustainability concepts, thereby affecting their ability to apply these principles in real-world engineering contexts.

Additionally, the finding on limited community involvement (WM = 3.27) suggests that sustainability efforts are still mostly confined within the institution and have not fully extended to external stakeholders or outside the community. This limits the broader impact of sustainability programs, as community engagement is important in reinforcing practical applications and upholding a culture of sustainability beyond the academic environment.

Overall, the results imply that SUCs in CALABARZON are in a developing or transitional stage of educational sustainability implementation. While awareness and initial efforts are available, relevant improvements are needed in the allocation of fund, development in infrastructure, formulation of policies and sustainability guidelines, and curriculum



integration. Addressing these challenges requires a comprehensive and strategic approach that includes improving institutional policies, prioritizing and increasing investment

in sustainable facilities, enhancing instructional resources, and promoting active involvement among stakeholders.

Table 14 Problems on Educational Sustainability as Perceived by the Students and Faculty Members

Indicators	Students (n = 1020)		Faculty Members (n = 56)	
	Weighted Mean / (Standard Deviation)	Verbal Interpretation	Weighted Mean / (Standard Deviation)	Verbal Interpretation
Insufficient fund for programs and initiatives	3.65 (1.1758)	High	3.82 (1.0463)	High
Lack of clear policies on educational sustainability	3.25 (1.3879)	Moderate	3.41 (1.3318)	High
Limited integration of sustainability in the curriculum	3.28 (1.3081)	Moderate	3.16 (1.3454)	Moderate
Lack of awareness and interests in sustainability issues	3.32 (1.3992)	Moderate	3.32 (1.3363)	Moderate
Insufficient eco-friendly facilities within the school	3.31 (1.3859)	Moderate	3.50 (1.2649)	High
Lack of clear indicators to assess educational sustainability	3.30 (1.3946)	Moderate	3.45 (1.2638)	High
Resistance to sustainable practices like recycling, etc.	3.22 (1.4309)	Moderate	3.30 (1.2493)	Moderate
Increased cost of green technologies and infrastructures	3.30 (1.3659)	Moderate	3.30 (1.2198)	Moderate
Lack of teaching materials on sustainability concepts	3.38 (1.3709)	Moderate	3.29 (1.2893)	Moderate
Limited community involvement in school sustainability programs	3.32 (1.3867)	Moderate	3.27 (1.2576)	Moderate
Average Mean	3.33	Moderate	3.38	Moderate

Legend: 1.00-1.80=Very Low 1.81-2.60=Low 2.61-3.40=Moderate 3.41-4.20=High 4.21-5.00=Very High

Part V. Strategies that Provide Greater Impact in Educational Sustainability

The table shows that students perceived sustainable teaching and learning practices as the most important strategy followed by integration of education for sustainable development (ESD) into the curriculum, institutional policies and governance, then the green campus and resources efficiency initiatives. Meanwhile, monitoring, evaluation,

and reporting systems, and the community and industry partnerships were treated as the least important strategies. Sustainable teaching and learning practices are important in higher education for the development of knowledge, skills, and values necessary to address current and future environmental, social, and economic challenges. These practices integrate sustainability principles into instruction to prepare the students so they can contribute to sustainable development as they graduate.



According to [UNESCO \(2017\)](#), education plays a crucial role in achieving sustainable development by equipping learners with the competencies needed to make informed decisions and take responsible actions for environmental integrity, economic viability,

and a just society. Sustainable teaching approaches encourage critical thinking, problem-solving, and participatory learning, which are vital in addressing complex global issues.

Table 15 Strategies on Educational Sustainability as Perceived by Engineering Students

Indicators	Rank
Sustainable teaching and learning practices	1
Integration of education for sustainable development (ESD) into the curriculum	2
Institutional policies and governance	3
Green campus and resources efficiency initiatives	4
Capacity building of teachers and administrators	5
Alignment with national and global frameworks (SDGs, CHED)	6
Monitoring, evaluation, and reporting systems	7
Community and industry partnerships	8

The table shows that faculty members perceived institutional policies and governance as the most important strategy that provides greater impact on educational sustainability, followed by sustainable teaching and learning practices. The capacity building of teachers and administrations, and the integration of education for sustainable development (ESD) into the curriculum are also treated as the third and fourth important strategies, respectively. While the two least important strategies for educational sustainability are monitoring, evaluation, and reporting systems and community and industry partnerships.

The policies and governance, in general, play a critical role for the advancement of sustainability in education for it provides the structure and direction required for an effective implementation of sustainability programs and initiatives. As highlighted by [Tilbury \(2011\)](#), the governance mechanism helps institutions monitor, evaluate, and continuously improve sustainability practices. Effective policies also promote collaboration among stakeholders, including administrators, faculty, and students resulting into a strengthened institutional engagement.

Table 16 Strategies on Educational Sustainability as Perceived by Faculty Members

Indicators	Rank
Institutional policies and governance	1
Sustainable teaching and learning practices	2
Capacity building of teachers and administrators	3
Integration of education for sustainable development (ESD) into the curriculum	4
Alignment with national and global frameworks (SDGs, CHED)	5
Green campus and resources efficiency initiatives	6
Monitoring, evaluation, and reporting systems	7
Community and industry partnerships	8



4. Conclusions

Based on the findings presented, the following conclusions are drawn:

Most Engineering students are within the age range of 19–20 years, implying that the sample is largely composed of individuals in the early stage of tertiary education. The relatively balanced distribution in terms of sex reflects inclusivity in engineering programs, although male respondents slightly dominate. In terms of program distribution, Bachelor of Science in Electronics Engineering (BSECE) had the highest representation, while Bachelor of Science in Computer Engineering (BSCpE) had the least. The majority of respondents being first-year students reveals that their knowledge and practices may still be developing. Institutional representation shows a concentration of respondents from Quezon. For faculty members, most respondents are from Rizal, while only a small proportion are from Cavite. Majority of them hold the rank of Instructor, while only a few occupy higher academic ranks such as Professor, suggesting that they are still in the early stages of their academic careers which may be associated with ongoing graduate studies and limited research outputs required for promotion. Furthermore, the dominance of faculty with 1–5 years of service supports the idea of a relatively young and developing academic workforce in SUCs, possibly because of the continuous turnover due to retirements of senior faculty and the growing demand for specialized programs.

Both Engineering students and faculty members are highly knowledgeable in terms of educational sustainability, suggesting that sustainability concepts are already well-integrated into the academic environment, possibly through curriculum inclusion, institutional policies, and awareness programs. The minimal difference between the two groups implies a shared understanding of sustainability principles across academic roles.

In terms of practices, students demonstrated a high level of engagement in educational sustainability, while faculty members also exhibited strong implementation. Although both groups fall under the “highly practiced” category, the slightly lower mean among faculty may indicate constraints such as workload, limited resources, or institutional barriers that affect consistent application.

There was no significant difference between the knowledge and practices of students and faculty members regarding educational sustainability. This implies alignment between what is taught and what is practiced within SUCs, suggesting that sustainability education is consistently communicated and adopted across both groups. It also indicates that both students and faculty contribute collaboratively to sustainability efforts within the academic community.

Among the identified challenges, insufficient funding for sustainability programs and initiatives emerged as the most critical problem, which underscores the importance of financial support in sustaining environmental and educational initiatives. Limited funding can restrict the availability of instructional materials, training opportunities, and implementation of sustainability-related projects, thereby hindering long-term institutional commitment.

The strategies proposed in the study were all perceived as highly effective by both students and faculty members. This reflects a strong recognition of actionable measures that can enhance educational sustainability, such as integrating sustainability into curricula, strengthening institutional policies, and promoting active participation in environmental programs.

Similarly, the suggested improvements were evaluated as highly effective, indicating that



respondents are receptive to enhancements aimed at strengthening sustainability practices. This demonstrates a positive outlook toward continuous development and reinforces the need for institutions to prioritize innovation, capacity building, and resource allocation to further advance sustainability efforts.

Recommendations

Based on the conclusions, the following recommendations are offered:

SUCs should implement faculty development programs, including scholarships, graduate studies support, and research incentives, to assist instructors in advancing to higher academic ranks, consistent with the standards of the Commission on Higher Education (CHED).

Institutions should establish mentorship and capacity-building initiatives for early-career faculty (1–5 years in service) to enhance teaching effectiveness, research productivity, and engagement in sustainability programs.

HEIs should sustain and continuously enhance sustainability education by embedding it across all engineering disciplines, ensuring that concepts remain relevant, updated, and aligned with global standards such as those promoted by the United Nations Sustainable Development Goals (SDGs).

HEIs should implement regular curriculum review and faculty training to maintain high level of sustainability knowledge for both the students and faculty members. They should strengthen the transition of knowledge into practice through the implementation of sustainability projects, community engagement, and campus-based environmental programs. They must also review faculty workload and provide institutional support and incentives to encourage greater participation in sustainability practices and initiatives.

SUCs should promote collaborative sustainability initiatives such as joint research, extension programs, and sustainability campaigns, to further reinforce their aligned knowledge and practices. Institutions may establish or strengthen Sustainability Offices or Committees to coordinate and monitor collaborative efforts across departments.

HEIs should prioritize budget allocation for sustainability programs, ensuring adequate financial support for instructional materials, training, and project implementation. They should seek external funding and partnerships with government agencies and organizations such as the Department of Science and Technology (DOST) to supplement limited resources.

The identified strategies should be institutionalized through formal policies and strategic plans to ensure their long-term implementation and consistency across SUCs. HEIs should establish monitoring and evaluation mechanisms to assess the effectiveness of these strategies and guide continuous improvement.

Institutions should adopt innovative approaches such as digital technologies, green infrastructure, and interdisciplinary teaching methods to further enhance sustainability practices. Continuous capacity-building programs, seminars, and workshops should be conducted to maintain stakeholder engagement and awareness.



References

- [1] ABET. (2023). Criteria for accrediting engineering programs, 2023-2024. <https://www.abet.org>
- [2] Aleixo, A. M., Leal, S., & Azeiteiro, U. (2020). Higher education students' training in sustainability: A comparative study. *International Journal of Sustainability in Higher Education*, 21(3), 1-18. <https://doi.org/10.1108/IJSHE-07-2019-0220>
- [3] Barth, M., & Rieckmann, M. (2016). State of the art in research on higher education for sustainable development. *Handbook of Higher Education for Sustainable Development*.
- [4] Beagon, U., Kövesi, K., Tabas, B., Nørgaard, B., Lehtinen, R., Bowe, B., Gillet, C., & Spliid, C. M. (2022). Preparing engineering students for the challenges of the SDGs: What competences are required? *European Journal of Engineering Education*, 48(1), 1-23. <https://doi.org/10.1080/03043797.2022.2033955>
- [5] Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.
- [6] Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.
- [7] Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- [8] Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.
- [9] Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175-191.
- [10] Filho, W. L., Shiel, C., & Paco, A. (2018). Implementing and operationalising integrative approaches to sustainability in higher education: The role of project-oriented learning. *Journal of Cleaner Production*, 133, 126-135.
- [11] Foulks, E., & Fournier, H. (2023). Students' knowledge and attitudes toward sustainability in higher education. *Sustainability*, 15(7), 6231. <https://doi.org/10.3390/su15076231>
- [12] Lozano, R., Barreiro-Gen, M., Lozano, F., & Sammalisto, K. (2019). Teaching sustainability in higher education: A critical review. *Journal of Cleaner Production*, 226, 154-176. <https://doi.org/10.1016/j.jclepro.2019.04.071>
- [13] Lozano, R., Lukman, R., Lozano, F. J., Huisinigh, D., & Lambrechts, W. (2013). Declarations for sustainability in higher education: Becoming better leaders, through addressing the university system. *Journal of Cleaner Production*, 48.
- [14] Mulder, K. F., Segalàs, J., & Ferrer-Balas, D. (2012). How to educate engineers for/in sustainable development: Ten years of discussion, remaining challenges. *International Journal of Sustainability in Higher Education*, 13(3), 211-218. <https://doi.org/10.1108/14676371211242535>
- [15] Redman, E. (2013). Opportunities and challenges for integrating sustainability education into K-12 schools: Case study Phoenix, AZ. *Journal of Teacher Education for Sustainability*, 15(2), 5-24. <https://doi.org/10.2478/jtes-2013-0008>
- [16] Sterling, S. (2014). *Sustainable education: Revisioning learning and change*. Green Books.
- [17] Sterling, S. (2016). A commentary on education and sustainable development goals. *Journal of Education for Sustainable Development*, 10(2), 208-213.
- [18] Tilbury, D. (2011). *Education for sustainable development: An expert review of processes and learning*. UNESCO.
- [19] UNESCO. (2017). *Education for sustainable development goals: Learning objectives*. UNESCO Publishing.
- [20] United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development* (A/RES/70/1). <https://sdgs.un.org/2030agenda>
- [21] Wals, A. E. J. (2015). Beyond unreasonable doubt? Education and learning for sustainability in the Anthropocene. *UNESCO Education Research and Foresight*.
- [22] Yuan, X., & Zuo, J. (2013). A critical assessment of the sustainability knowledge of university students in China. *International Journal of Sustainability in Higher Education*, 14(2), 152-163. <https://doi.org/10.1108/14676371311312885>