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Mentoring Program Intervention for Professional Electrical Engineering Accreditation: Inputs to EE Curriculum Development

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Abstract: The objectives of this study were to ascertain the effect of the mentoring program on the intellectual core of graduating electrical engineering students interested in pursuing Professional Electrical Engineering (PEE) accreditation and to develop an appropriate engineering curriculum that meets the pre-requisites and requirements for achieving the aforesaid accreditation's technical understanding. Additionally, this study examined the students' preparation for professional subjects and intellectual competence, as well as their relationship to the respondents' skill competencies. This study used a validated instrument to assess engineering students' theoretical knowledge and skills in evaluating an existing electrical industrial design found in a technical engineering report for PEE. The study's findings indicated that students had obtained a modest level of professional subject readiness ($\bar{x}$=79). Additionally, the mentorship program's intervention enhanced students' intellectual competence ($\bar{x}$=82) in electrical engineering core competencies, while also demonstrating a moderate level of skill capabilities ($\bar{x}$=87). Additionally, a moderate degree of significance was discovered between the students' professional subject readiness ($r=-0.32$, $p<0.05$) and their intellectual capability. In conclusion, the implementation of the PEE mentorship program considerably enhanced ($t=26$, $p<0.05$) the intellectual comprehension of engineering students regarding the substance of the technical engineering report required for PEE accreditation.
Keywords: PEE Accreditation, PEE Mentoring, Professional Subject Readiness, Skill Competencies, Theoretical Knowledge Grade Assessment, Practical Outcome Assessment, Technical Engineering Report

1. Introduction

Mentoring is a technique of helping people learn new skills and knowledge from experienced managers who are well-versed in the ways of the world. People who have been trained in the art of mentoring provide direction, practical counsel, and ongoing support to help the mentee go through their learning and development journey. (https://www.yourarticlelibrary.com)

Academic, personal, and professional spheres are all included. When mentors and protégés work together in a mentoring program, the mentors and protégés benefit from each other's expertise and help each other grow professionally, academically, or socially. In order to tear down obstacles and provide possibilities for achievement, a successful mentor program is essential.

The study "Mentoring Future Engineers in Higher Education" (2017) found that interactions between professional engineers and engineering students, based on an understanding and implementation of the aforementioned engineering education difficulties, can aid in their mentoring.

RA 7920 notes that electrical engineers have a wide range of professional roles and specializations, from design and sales to overseeing transmission and distribution systems, electrical analysis, and energy management systems.

Background of the Study

A PEE accreditation can only be obtained in the Philippines if you have a REE license and a number of years of professional experience, among other requirements. Most electrical engineering grads are taking the REE licensing exam but not the PEE certification.

There are several factors that discourage electrical engineers from pursuing PEE accreditation. For example, REEs are unaware of the requirements, their professional work is not aligned with their line of specialization, the process is time consuming, which may affect the quality of their work, the accreditation requires a limited range of types of professional experience, and the technical engineering report must be prepared.

Additionally, one of the most time-consuming aspects of the certification process is the development of a technical engineering report.

The following categories are used to categorize the content of technical engineering reports: (1) design, (2) evaluation and (3) analysis. Each of these factors varies depending on how long the industrial system has been in place.

The following describes the format and content of various types of technical engineering reports: 1. Load Schedule Calculation 2. Voltage Drop Calculations 3. Per Unit Calculation 4. Short Circuit Calculation 5. Protection & Coordination and 6. Arc Flash Analysis

In their final years of undergraduate study, academic universities offer electrical engineering courses that culminate in electrical design system analysis.This electrical system design is in accordance with the technical engineering report's specifications.

On the other hand, electrical system design is classified into numerous categories, including residential, commercial, and industrial design, grounding and system design, and substation and transmission system design. As a result, the emphasis is placed exclusively on one or more of these design types.

As a result, the formulation and evolution of electrical system design differs according to the type of specialization.

Adamson University is one of the prestigious university that offers electrical engineering programs. The university's national performance in electrical engineering board examinations is significantly higher than the national passing rate. However, empirical data suggests that, after passing the REE examination, the majority of students do not pursue PEE accreditation (see Figure 1). This is attributed to the proper orientation as stipulated in the requirements of PEE accreditation at the same time, the nitty-gritty of professional experience requirements and TER development.

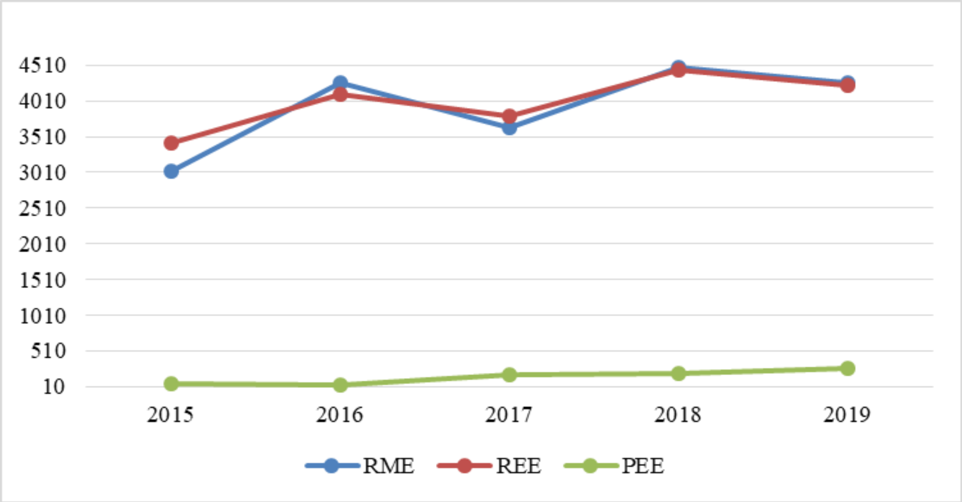

Figure 1 RME, REE and PEE Passers Population Trend SY 2015 – SY 2019

From the school year 2003-2004 to the school year 2013-2014, an average of 63 students graduated every year, as shown in Table 2.1 and Figure 2. As shown in Table 2.1 and Figure 3, the average total enrollment and freshman enrollment per year for the same period were 404 and 116 students, respectively.

Table 2.1 shows the historical data on annual graduates from 2003 to 2014. Historical data of annual graduates comprises each school year (SY). SY 2004-2005 had the highest number of graduates, with a total of 112 students. SY 2010-2011 has the lowest number of graduates with a total of 30 students.

Table 2.1 Historical Data on Annual Graduates SY 2003 – SY 2014

School Year	Mid-Year	Year-End	Total
2003-2004	62	41	103
2004 - 2005	55	57	112
2005 - 2006	24	67	91
2006 - 2007	56	42	98
2007 - 2008	25	16	41
2008 - 2009	15	21	36
2009 - 2010	30	17	47

2010 - 2011	14	16	30
2011 - 2012	21	18	39
2012 - 2013	17	29	46
2013 - 2014	24	21	45

Table 4.1
Respondents' Level of Achievement in Professional Subject Readiness (PSR)

Professional Subject Readiness (PSR)	Mean Score/Grade	Interpretation
Theoretical Knowledge Grade Assessment (TKGA)	**78**	**Achieved to a Moderate Extent**
Electrical System Design Lecture	73	Achieved to a Lesser Extent
Power System Analysis & Design Lecture	81	Achieved to a Moderate Extent
Practical Outcome Assessment (POA)	**80**	**Achieved to a Moderate Extent**
Electrical System Design Laboratory	76	Achieved to a Lesser Extent
Power System Analysis & Design Laboratory	84	Achieved to a Moderate Extent
Over-all	**79**	**Achieved to a Moderate Extent**

Legend: 94-100 Totally Achieved; 86-93 Achieved to a Greater Extent; 78-85 Achieved to a Moderate Extent; 70-77 Achieved to a Lesser Extent; 0-69 Not Achieved

Table 4.1 summarizes the respondents' assessed level of Professional Subject Readiness (PSR) using the Theoretical Knowledge Grade Assessment (TKGA) and the Practical Outcome Assessment (POA), which were both conducted on subjects closely related to the profession: Electrical System Design (ESD) and Power Systems and Analysis Design (PSAD) (PSAD). Academic audits of this type contribute significantly to the establishment of baseline data (Riley, 2016). The 2019 academic records of 40 respondents enrolled in the subjects were utilized to measure the degree of achievement for the total population using the mean grade, according to the university's standard interpretation. Tables A and B of Appendix A contain the frequency distributions of the mean TKGA and POA scores.

The table indicates that respondents' mean level achievement on theoretical and practical assessments (TKGA and POA) was deemed to be modest. To a lesser extent, the ESD evaluation that resulted is attributable to the disorganized sequential flow of themes leading to a knowledge of ESD.

The TKGA and POA were regarded to be moderately assessed generally, which can be ascribed to respondents' study habits, learning styles, and perception (Demirbas & Demirkan, 2007). Their passion may be discounted because they are required to be interested in the subject because it is their specialty, but this result can be attributed to the students' level of appreciation for the subject and their capacity to transcend the bare minimum input. Additionally, the mild level of PSR may be linked to the academic curriculum's strength in terms of addressing the course's most significant professional subject success gap (Palumbo & Kramer-Vida, 2012). The achievement gap described previously can also be addressed and minimized by introducing opportunities and extracurricular activities (Erwin, Fedewa, & Ahn, 2017) that encourage students to engage in academic undertakings (Jones et al., 2014).

Table 4.2 presents the respondents' extent of intellectual capability before and after the intervention of mentoring program

Table 4.2
Respondents' Intellectual Capability Before and After the Intervention of Mentoring Program

Intellectual Capability	Before		After	
	Pretest Mean Score/Grade	Interpretation	Post-test Mean Score/Grade	Interpretation
Electrical Load Schedule	50	Not Capable	93	Capable to a Greater Extent
Voltage Drop	58	Not Capable	87	Capable to a Greater Extent
Per Unit Impedance	35	Not Capable	85	Capable to a Moderate Extent

Short Circuit	29	Not Capable	75	Capable to a Lesser Extent
Protection & Coordination	41	Not Capable	78	Capable to a Moderate Extent
Arc Flash	41	Not Capable	81	Capable to a Moderate Extent
Average	**41**	**Not Capable**	**82**	Capable to a Moderate Extent

Legend: 94-100 Highly Capable; 86-93 Capable to a Greater Extent; 78-85 Capable to a Moderate Extent; 70-77 Capable to a Lesser Extent; 0-69 Not Capable

The respondents' intellectual capability (IC) prior to and post the mentoring program intervention was measured in terms of mean grade for subjects encompassing the following topics: Table 4 illustrates the following: (1) Electrical Load Schedule; (2) Voltage Drop; (3) Impedance per unit; (4) Short Circuit; (5) Protection and Coordination; and (6) Arc Flash. 2. The respondents' marks were gathered from their examination booklets, and their intellectual capacities were quantified before and after the mentorship intervention program using BlackBoard e-Learn platforms.

As can be seen, the short circuit capability was only attained to a limited degree. The reason for this is that some disciplines do not fit harmoniously with the semester's offerings, resulting in a diverse focus on discussion and comprehension of the distinctiveness of short circuit specialization.

For the majority of the areas covered in the examination, respondents often demonstrate incapacity, particularly when it comes to issues covered under Power Systems Analysis and Design (PSAD), where respondents scored lower than they did on topics covered under Electrical System Design (ESD). With the introduction of an intervention program (King et al., 2019), in which the aforementioned topics are thoroughly discussed and shortcomings of on-semester lectures are addressed, intellectual capability evolved from being incompetent across the board to being capable of greater extent, particularly on the load schedule and voltage drop topics, and capable of moderate extent on the remaining topics. It cannot be ruled out that the intervention program stimulates respondents' intellectual capability. The affirmative extent of capability gained through the mentorship program, on the other hand, may be accepted by students as a motivating factor that helps them develop growth mindsets (Brougham & Kashubeck-West, 2018). Additionally, professional electrical engineers engage in a type of social networking (Delay et al., 2016), serving as peers who assist candidates for professional certification in developing their technical engineering knowledge. This type of peer contact benefits the development of technical knowledge confidence (Delay, et al., 2016, Herpen et al., 2019).

Table 4.2.1
Respondents' Intellectual Capability Before and After the Intervention of Mentoring Program

Intellectual Capability Core	**Test**	Highly Capable *(94-100)*		Capable to a Greater Extent *(86-93)*		Capable to a Moderate Extent *(78-85)*		Capable to a Lesser Extent *(70-77)*		Not Capable *(0-69)*	
		f	**%**	***f***	**%**	***f***	**%**	***f***	**%**	***f***	**%**
Electrical Load Schedule	Pre-test	-	-	-	-	3	7.5%	1	2.5%	36	90%
	Post Test	22	55%	8	20%	8	20%	1	2.5%	1	2.5%
Voltage Drop	Pre-test	-	-	-	-	2	5%	8	20%	30	75%
	Post Test	8	20%	12	30%	14	35%	6	15%	-	-
Per Unit Impedance	Pre-test	-	-	-	-	-	-	-	-	40	100%
	Post Test	10	25%	11	27.5 %	11	27.5 %	2	5%	6	15%
Short Circuit	Pre-test	-	-	-	-	-	-	-	-	40	100%
	Post Test	-	-	6	15%	7	17.5 %	16	40%	11	27.5%
Protection &	Pre-test	-	-	-	-	-	-	-	-	40	100%

Coordination	Post Test	2	5%	7	17.5 %	11	27.5 %	8	20%	12	30%
Arc Flash	Pre-test	-	-	-	-	-	-	-	-	40	100%
	Post Test	4	10%	5	12.5 %	16	40%	11	27.5 %	4	10%
Average Capability	Pre-test	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	40	100%
	Post Test	**2**	**5%**	**12**	**30%**	**14**	**35%**	**12**	**30%**	**-**	**-**

Table 4.2.1 summarizes the comparative distribution of respondents' intellectual capability. Electrical Load Schedule and Voltage drop reveal a skewed distribution, with the bulk of responders falling into the incapable category, ranging from 70% to 90%. However, some individuals demonstrate a modest to moderate level of capability in both fields.

For the core areas that fall under PSAD, all respondents demonstrate an inability to demonstrate their knowledge of the topics. This situation arises as a result of the nature skillset necessary for PSAD, which involves the following:

(1) Consistency with the intended outcome of the course
(2) Practical exposure of responders to building design, substation design, and other electrical engineering-related design applications, including recent trends and the status quo
(3) The subject matter is presented in a sequential fashion.
(4) Standards established for respondents' on-the-job training (OJT) program, the distinct set of activities required of learners.
(5) Laboratory activities are not intended to meet the requirements for skills.

Additionally, one could argue that the Commission on Higher Education (CHED), the regulating body that establishes the program's national criteria, and the PEE TER standards have distinct foci.

The intervention mentorship program results in an explicit development of respondents' capability, with an average of 35% demonstrating moderate capability and 30% demonstrating stronger skill. The intervention even spread an average yield of 5%, demonstrating excellent capabilities, with the most dramatic improvement in Electrical Load Schedule, voltage drop, and per-unit impedance. Additionally, the intervention alleviated the problem by eliminating intellectual incapacity for these subjects and relocating the lowest capability to a smaller amount

Table 4.3
Respondents' Level of Skill Competencies

Skill Competencies	Mean Score/Grade	Interpretation
Ability to Prepare Electrical Load Schedule Calculation	85	Demonstrated to a Moderate Extent
Voltage Drop Calculation	87	Demonstrated to a Moderate Extent
Per Unit Impedance Calculation	89	Demonstrated to a Moderate Extent
Short Circuit Calculation	89	Demonstrated to a Moderate Extent
Develop a Protection and Coordination Diagram	91	Demonstrated to a Greater Extent
Interpret Arc Flash Scenario	83	Demonstrated to a Lesser Extent
Over-all	**87**	**Demonstrated to a Moderate Extent**

Legend: 96-100 Totally Demonstrated; 90-95 Demonstrated to a Greater Extent; 84-89 Demonstrated to a Moderate Extent; 78-83 Demonstrated to a Lesser Extent; 0-77 Not Demonstrated

The respondents' overall skill set indicates that they are capable of demonstrating their abilities at a moderate level. This is defined by activities that are appropriate for the goals and objectives established for laboratory subjects. The responders' view and comprehension are influenced by their actualization and application experiences. This mode of instruction is particularly prevalent in the engineering industry, where students place a higher premium on application over theory (Masmoudi et al., 2020).

However, a greater degree of demonstration is evident in the evolving protection and coordination diagram, which illustrates a confusing conflict. The subject in question moves quickly in comparison to other subjects, but the respondents' knowledge is astounding. The validity of the skills exam set must be examined in further detail. There may be negative consequences associated with the use of online platforms to assess talents that need physical appearance. Additionally, this may be an idiosyncrasy of the constructivist perspective in education, which alters the paradigm of learning from teacher-centered to student-centered, emphasizing the distinction between theoretical and applied knowledge.

Additionally, respondents demonstrate a lower level of understanding when it comes to arc flash scenario interpretation; this is mostly due to a knowledge gap between mentoring discussions and the competence exam presented to respondents. This contradicts the results of the protection and coordination skills examination, which indicates that arc flash skills require prior knowledge to comprehend. Apart from the fact that arc flash notions are based on equations, this indicates that arc flash calculation is a more theoretical discipline than one that requires design expertise.

It may be argued that respondents respond positively to a posteriori experience, as demonstrated in Table 4.3, implying a strong perception of learning occurring prior to observations and experience, such as laboratory sets.

Table 4.3.1 summarizes the skill set required for each core skill competency. The table demonstrates the normal distribution of respondents' moderate skill, with 60% demonstrating this level. This is primarily due to the following groups of arguments:

(1) less emphasis on practical knowledge to supplement theoretical knowledge provided;
(2) less emphasis on critical thinking abilities in both existential and ontological learning, the foundations of education.
(3) less depiction of a more rigorous application of learning requirements rather than a simple conversation or mentorship, given that pupils may have a proclivity for facileness.

Table 4.3.1
Respondents' Level of Skill Competencies

Skill Competencies	**Totally Demonstrated (96-100)**		**Demonstrated to a Greater Extent (90 to 95)**		**Demonstrated to a Moderate Extent (84 to 89)**		**Demonstrated to a Lesser Extent (78 to 83)**		**Not Demonstrated (0 to 77)**		**Total**	
	f	**%**	***f***	**%**	***f***	**%**	***f***	**%**	***f***	**%**	***f***	**%**
Ability to Prepare Electrical Load Schedule Calculation	3	7.5%	5	12.5%	14	35%	12	30%	6	15%	40	100%
Voltage Drop Calculation	8	20%	8	20%	9	22.5%	9	22.5%	6	15%	40	100%
Per Unit Impedance Calculation	5	12.5%	18	45%	6	15%	10	25%	1	2.5%	40	100%
Short Circuit Calculations	8	20%	13	32.5%	7	17.5%	10	25%	2	5%	40	100%
Develop a Protection & Coordination Diagram	10	25%	17	42.5%	9	22.5%	3	7.5%	1	2.5%	40	100%
Interpret Arc Flash Scenario	5	12.5%	6	15%	5	12.5%	10	25%	14	35%	40	100%
Average Skill Competencies	**-**	**-**	**10**	**25%**	**24**	**60%**	**5**	**12.5%**	1	2.5%	40	100%

Interestingly, the distribution of those who can perform to a larger extent than those who can perform to a lower extent is greater than the distribution of those who can perform to a lesser extent, with a negligible distribution for those who are incapable of demonstrating talent. When compared to the respondents' intellectual capacity, as seen in Table 4, this major contradiction becomes apparent. 2.1 of this study is substantially verified by the findings of (Feisel, L.D., and Rosa, A.J, 2005), which indicate that undergraduate students substantiate learning processes through observation and quantification of results, rather than through numerical explanations of results and phenomena.

Prior to the mentorship program intervention, Table 4.4 shows the association between respondents' professional subject preparation and intellectual capability. Academic preparedness is a well-established notion that has been extensively researched (Lumaurridlo, et al., 2020, Watts, et al., 2018).

Table 4.4
Relationship between Professional Subject Readiness and Intellectual Capability of Respondents Before the Mentoring Program Intervention

Professional Subject Readiness	Intellectual Capability	Computed r	Sig	Decision on Ho	Interpretation
Theoretical Knowledge Grade Assessment (TKGA)	Electrical Load Schedule	-0.51	0.01	Rejected	Significant
	Voltage Drop	-0.37	0.02	Rejected	Significant
	Per Unit Impedance	-0.57	0.00	Rejected	Significant
	Short Circuit	-0.22	0.16	Accepted	Not Significant
	Protection & Coordination	-0.34	0.03	Rejected	Significant
	Arc Flash	-0.12	0.48	Accepted	Not Significant
	Average	-0.39	0.01	Rejected	Significant
Practical Outcome Assessment (POA)	Electrical Load Schedule	-0.23	0.15	Accepted	Not Significant
	Voltage Drop	-0.15	0.36	Accepted	Not Significant
	Per Unit Impedance	-0.38	0.02	Rejected	Significant
	Short Circuit	-0.06	0.72	Accepted	Not Significant
	Protection & Coordination	-0.13	0.42	Accepted	Not Significant
	Arc Flash	0.03	0.87	Accepted	Not Significant
	Average	-0.18	0.27	Accepted	Not Significant
Over-all PSR	**Over-all Intellectual Capability**	**-0.32**	**0.04**	**Rejected**	**Significant**

Note: If Computed r is: 0 = No Correlation; below ± 0.29=Low degree; ; between ± 0.30 and ± 0.49 = Moderate degree; between ± 0.50 and ± 1 = High degree; If near ± 1 = Perfect correlation

The Pearson Correlation Coefficient is used to examine the statistical relationship between respondents' Professional Subject Readiness (PSR) and Intellectual Capacity (IC) prior to the introduction of the intervention mentorship program.

There is a strong association between Electrical Load Schedule and Per Unit Impedance in these TKGA data. However, there is a considerable correlation between intervention and respondents' prior intellectual capability. This demands an intervention mentorship program to help respondents enhance their intellectual standing. Additionally, the topic of academic preparation has received extensive research.

All performance measures have a low degree of association with POA, except for the Per Unit Impedance calculation, which has a considerable degree of correlation. This indicates that there is no causation or significant link between the indicators of Practical Outcome Assessment (POA) and mentoring intervention prior to the mentoring intervention. Additionally, this is demonstrated by the correlation insignificance for all

indicators except Per Unit Impedance Calculation, which demonstrates correlation significance, indicating that respondents have previously acquired sufficient information regarding Per Unit Impedance Calculation.
TKGA and POA were found to have a substantial negative correlation with the electrical load schedule, per unit impdance, voltage drop, and protection coordination calculation. This is due to the ambiguity inherent in the technical notions taught during lectures and the technical usage of the same term in the mentorship program. This has created a conundrum about pupils' correct comprehension of the technical definition of the term. In this situation, because the word voltage drop has a variety of formulas and definitions in an electrical engineering course, when a student discovers a method of computing it that differs from their prior knowledge, a mental block or perplexity ensues.Overall, there is a moderate correlation between respondents' intellectual capability and effect size, which indicates a modest effect on the respondents' population. This is further supported by the considerable correlation between the intervention program and respondents' intellectual capability. These findings emphasize the importance of developing an intervention program that can help children acquire context-specific information and psychomotor abilities (Lane, et al., 2017).

Table 4.5
Relationship Between Professional Subject Readiness and Skill Competencies of Respondents After the Mentoring Program Intervention

Professional Subject Readiness (PSR)	**Skill Competencies**	**Computed r**	**Sig**	**Decision on Ho**	**Interpretation**
Theoretical Knowledge Grade Assessment (TKGA)	Ability to prepare Electrical Load Schedule Calculation	-0.01	0.94	Accepted	Not Significant
	Voltage Drop Calculation	-0.21	0.20	Accepted	Not Significant
	Per Unit Impedance Calculation	-0.04	0.82	Accepted	Not Significant
	Short Circuit Calculation	-0.29	0.07	Accepted	Not Significant
	Develop Protection & Coordination Diagram	-0.29	0.07	Accepted	Not Significant
	Interpret Arc Flash Scenario	0.18	0.28	Accepted	Not Significant
	Average	-0.21	0.20	Accepted	Not Significant
Practical Outcome Assessment (POA)	Ability to prepare Electrical Load Schedule Calculation	-0.05	0.76	Accepted	Not Significant
	Voltage Drop Calculation	-0.07	0.65	Accepted	Not Significant
	Per Unit Impedance Calculation	0.07	0.67	Accepted	Not Significant
	Short Circuit Calculation	-0.12	0.46	Accepted	Not Significant
	Develop Protection & Coordination Diagram	-0.19	0.25	Accepted	Not Significant
	Interpret Arc Flash Scenario	0.36	0.03	Rejected	Significant
	Average	0.01	0.09	Accepted	Not Significant
Over-all PSR	**Over-all Skills Competencies**	**-0.09**	**0.57**	**Accepted**	**Not Significant**

Using the Pearson Correlation Coefficient, Table 4.5 examines the statistical link between respondents' Professional Subject Readiness (PSR) and Skill Competencies (SC) following the implementation of an intervention mentoring program.

The existence of a significant positive association between the assessment of practical outcomes and the interpretation of arc flash scenarios. This is due to the calisthenics of electrical abilities that are introduced and developed through a software-based approach. Due to the fact that arc flash scenario interpretation requires the same software and methodology as laboratory software, their knowledge with laboratory software facilitates their comprehension of the arc flash program.

As the table indicates, there is little link between respondents' intellectual capability and the administration of intervention mentoring. Additionally, the association between electrical engineering skill competencies and professional subject readiness is minimal. This can be linked to a lack of mastery of the abilities necessary to acquire a high level of cognitive comprehension (Jaudinez, 2019, Del, et al., 2016). The intricacies of debate in PSA and ESD at the undergraduate level have been reinvented and centered on the mentorship program's streamlined approach. However, prior to recommending the mentorship program, a thorough discussion and evaluation of significant facts and their effects on the pupils must be conducted and accounted for.

Table 4.6 presents the differences between the performance of students before and after the mentoring program

Table 4.6
Differences Between the Performance of Students Before and After the Mentoring Program

Core	Test	Mean Score/ Grade	SD	Computed t-value	Sig	Decision on Ho	Interpretation
Electrical Load Schedule	Pre-Test	50	11.2	21.5	0.00	Rejected	Significant
	Post Test	93	9.1				
Voltage Drop	Pre-Test	58	12.4	11.9	0.00	Rejected	Significant
	Post Test	87	8.9				
Per Unit Impedance	Pre-Test	35	9.6	22.1	0.00	Rejected	Significant
	Post Test	85	11.3				
Short Circuit	Pre-Test	29	7.7	27.8	0.00	Rejected	Significant
	Post Test	76	7.8				
Protection & Coordination	Pre-Test	41	10.5	17.6	0.00	Rejected	Significant
	Post Test	78	9.9				
Arc Flash	Pre-Test	41	7.4	27.5	0.00	Rejected	Significant
	Post Test	81	8.4				
Over-all	Pre-Test	41	8.3	26	0.00	Rejected	Significant
	Post Test	82	7.5				

The statistical link between the pre- and post-intervention mentorship program is examined in Table 4.6. The data indicates that there is a substantial correlation between administering intervention mentoring and instilling a positive outcome for responders across all performance parameters. It is clear that when compared to a standard paradigm with no intervention, the mentorship program enhances respondents' intellectual capability.

The table indicates that there is a significant difference (p0.05) between the pretest and posttest scores. The mentorship program, as an intervention, significantly increased students' comprehension of the PEE accreditation and offered the meagered inputs essential to unearth the accreditation's fundamental issues (Popa et al., 2020). This can also be linked to the mentees' perceived faith in their mentors' ability to give high-quality knowledge (Schenk, et al., 2019). As a result, the mentoring program was successful (Efsthathiou et al., 2018, Masehela and Mabika, 2017). This might be ascribed to the streamlined direct matrix and pedagogical approaches incorporated into the instruction aimed at improving student comprehension of the technical parts of the professional engineering course.

A thorough curriculum guide and course syllabus have been prepared in response to the study's findings (see Appendix D and Appendix E). Each item on the list was chosen to meet the needs of engineering students and the profession as a whole. The evolution of this work also reflected the coherence and consistency of the requirement for engineering abilities. Additionally, color-coded images were utilized to denote the extent to which a particular subject was employed in conjunction with a particular course.

Conclusion

The following conclusions were derived from the study:

1. The respondents' mean level of achievement in terms of Theoretical Knowledge Grade Assessment (TKGA) and Practical Outcome Assessment (POA) is considered to be achieved to a moderate extent.
2. The respondents' extent of the Intellectual Capability improve from not capable to capable to a moderate extent after the intervention of mentoring program.
3. The respondents' overall level of skills is demonstrated to a moderate extent in terms of the Ability to prepare Electrical Load, Schedule calculation, Voltage Drop calculation, Per Unit Impedance calculation, Short Circuit calculation, Develop a Protection & Coordination diagram, while that of their competency to Interpret Arc Flash scenario is gleaned as to a lesser extent.
4. Overall, the respondents' levels of achievement in their Professional Subject Readiness and their Intellectual Capability had a moderately negative degree of correlation.
5. Overall, the respondents' Professional Subject Readiness and their Skill Competencies were found to be not significant.
6. The mentorship program has heightened the level of understanding of IC and enhanced the level of skills of the respondents.

Recommendations:

The following recommendations were derived from the study:

1. In order to revitalize the moderate achievement of the electrical engineering students in their core subjects, it is recommended to re-align all the foundation subjects to be organized in such a way that the consistency and continuity of the flow of topics are strictly observed. This can be achieved by reviewing the contents of the technical subjects and putting emphasis on what needs to be given priority in the discussion.
2. There is a need to include a cognate elective for the technical aspect of the power system analysis and the electrical system design in order to strengthen their foundation in the six aspects of industrial design engineering.
3. The electrical system design subject should adopt and utilize, in a stricter sense, the requirements outlined in the building analysis so that the students can readily practice the six core competencies for the technical engineering report of the PEE accreditation. In addition, a checklist should be developed to assess and evaluate the said design.
4. The negative correlation between the PSR and the IC may be shifted by technical streaming from the understanding of the technical terms used in the field of practice to that of the theoretical notes. Practical exercises should be introduced containing more case studies that require a higher degree of in-depth analysis, thus drawing better critical analysis.
5. Since PSR does not have significant relationship with the skill competencies, it is recommended that a separate laboratory subject that will enhance their technical skills towards the 6 competencies. Furthermore, a separate research study must be conducted in order to develop an instrument that will determine the efficiency of the developed laboratory exercises to that of the result of the electrical system design analysis.
6. Furthermore, a research study must be conducted to determine the adversity quotient of the students to pursue PEE accreditation after they have undergone the enriched curriculum.

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