EduHeart Knowledge Network and Publishing, Inc.

Asian Research Journal of Education, 2026
E-ISSN: 3028-0842
P-ISSN: 3028-0834
Vol. 3 No. 3

DOI: https://doi.org/10.66206/eduheart.2026.334

# Skill Gaps Among Electrical Installation and Maintenance (EIM) Senior High School Students in Pangasinan II

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***ABSTRACT***

*Electrical Installation and Maintenance (EIM) is one of the specialized strands within the Technical-Vocational-Livelihood (TVL) strand. As technological and industry demands continue to grow, there is a need for competent, skilled graduates who can perform electrical installation tasks effectively and safely. This descriptive research identified the factors affecting the skill gaps among Electrical Installation and Maintenance (EIM) Senior High School students in Pangasinan II. It also examined the relationship between selected profile variables—Sex, General Weighted Average (GWA), and Average Family Income —and competency levels, as well as the predictive influence of student-related, instructional-related, teacher-related, and facilities/equipment-related factors. The finding revealed that sex showed no significant association, while GWA had a significant positive relationship with competency level, and average family income had a weak relationship. Moreover, student-related factors were the strongest predictors of competency across all areas, followed by instructional-related and teacher-related factors, which also contributed significantly. Equipment/facilities-related factors were not found to be significant predictors of students' competency level. It was concluded that student-related factors play the most critical role in competency development. The study recommended enhancing student motivation and engagement programs and strengthening hands-on training, improving instructional resources, enhancing teacher development, and implementing an Electrical Installation and Maintenance Competency Enhancement Program (EIM–CEP) to address skill gaps.*

***Keywords:*** *Skill gaps, Electrical Installation and Maintenance, competency level, TVL, EIM students*

## INTRODUCTION

A skill gap is the mismatch between the competencies expected by industry and those possessed by graduates or trainees. In the field of Electrical Installation and Maintenance (EIM), these skill gaps can negatively affect productivity, employability, and workplace safety.

Electrical Installation and Maintenance is one of the specialized strands under the Technical-Vocational-Livelihood (TVL) track in the Philippine K–12 curriculum. The program aims to equip students with technical knowledge and practical competencies in electrical installation, maintenance, wiring, troubleshooting, and safety procedures. Through TESDA National Certification programs, EIM students are expected to develop workplace-ready competencies aligned with industry standards.

However, despite the implementation of competency-based education and training, industries continue to report deficiencies in graduates' practical competencies. Studies have

Asian Research Journal of Education, 2026
E-ISSN: 3028-0842
P-ISSN: 3028-0834
Vol. 3 No. 3
DOI: https://doi.org/10.66206/eduheart.2026.334

shown that some EIM students struggle with rough-in activities, installation of protective devices, troubleshooting, grounding systems, and the practical application of electrical safety standards.

The present study is anchored on Human Capital Theory, Competency-Based Education, Experiential Learning Theory, and Skill-Mismatch Theory. Human Capital Theory explains that investment in education and training enhances worker productivity and employability. Competency-Based Education emphasizes performance-based learning aligned with industry standards. Experiential Learning Theory highlights the importance of practical experience in developing technical competencies, while Skill-Mismatch Theory explains the discrepancy between educational outcomes and labor market expectations.

In Pangasinan II, where several Senior High Schools offer EIM specialization, there is limited localized research examining the extent of skill gaps among EIM students and the factors contributing to the skills gap in Electrical Installation and Maintenance. Understanding these issues is essential in designing interventions that can improve competency development and enhance employability.

## Statement of the Problem

This study aims to determine the factors affecting the skills gap among Electrical Installation and Maintenance (EIM) Senior High School Students in Pangasinan II

Specifically, it aimed to answer the following questions:

1. What is the profile of the respondents in terms of:
   1.1Sex;
   1.2General Weighted Average (GWA); and
   1.3 Family Monthly Income?
2. What is the level of competency of students in performing:
   2.1 Rough-in activities, wiring, and cabling work for single-phase distribution, power, lighting and auxiliary systems;
   2.2 Installation of electrical protective devices for distribution, power, and lightning protection and grounding systems, and
   2.3 Installation of wiring devices of floor and wall-mounted outlets, lighting fixtures/switches, and auxiliary outlets?
3. Is there a significant relationship between the profile variables and the students' competency levels?
4. What factors affect the skill gap among EIM students in terms of:
   4.1 Student-related factors;
   4.2 Teacher-related factors;
   4.3 Instructional-related factors; and
   4.4 Facilities and equipment-related factors?
5. What intervention program may be proposed based on the findings of the study?

## Methodology

### Research Design

The study utilized a descriptive-correlational research design. The descriptive method was employed to determine the profile of the respondents and assess their competency levels in

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performing selected EIM skills. The correlational approach was used to examine the relationships between profile variables and competency levels and determine the factors affecting the skill gap.

This design was appropriate because it enabled the researcher to systematically describe existing conditions and determine the degree of relationship among variables without manipulating them.

**Respondents of the Study**

The respondents consisted of 301 Grade 12 EIM students enrolled in the School Year 2025–2026 from public schools --, namely, Angela Valdez Ramos National High School, Toboy National High School, Luciano Millan National High School, Mataas na Paaralan ng Juan C. Laya, San Jacinto National High School, San Fabian National High School, and Ariston-Bantog National High School

Stratified purposive sampling techniques were utilized to ensure proportional representation of respondents from participating schools.

**Research Instrument**

The study used a researcher-made questionnaire based on the TESDA Training Regulations for EIM NC II and related literature on competency assessment in technical-vocational education.

The questionnaire consisted of three parts, namely, Profile of respondents in terms of sex, GWA, and family monthly income; Level of competency in performing required EIM skills; and Factors affecting the skill gap. The competency section assessed three major skill areas, such as performing rough-in activities, wiring, and cabling works for single-phase distribution, power, lighting, and auxiliary systems; Installing electrical protective devices for distribution, power, lightning protection, and grounding systems; and installing wiring devices of floor and wall-mounted outlets, lighting fixtures/switches, and auxiliary outlets

A five-point Likert scale was used to measure competency and perceptions regarding factors affecting skill gaps.

**Validation of Instrument**

The instrument underwent expert validation by specialists in Electrical Installation and Maintenance and educational research. Necessary revisions were incorporated to ensure content validity and reliability.

**Data Gathering Procedure**

The researcher secured permission from the school principals prior to conducting the study. After approval, questionnaires were personally distributed to respondents. The respondents were informed about the purpose of the study, the confidentiality of their responses, and their voluntary participation.

Data were tabulated, analyzed, and interpreted using appropriate statistical tools.

**Statistical Treatment of Data**

Statistical tools used in the study included frequency and percentage distributions for respondents' profiles, means for competency levels, correlation analysis to determine

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relationships between variables, and multiple regression analysis to identify predictors of competency and skill gaps.

## RESULTS AND DISCUSSION

### Profile of the Respondents

The findings revealed that the majority of respondents were male, comprising 275 students or 91.4% of the total respondents, while only 26 students or 8.6% were female. This indicates that the EIM specialization remains predominantly male-dominated. The findings support Sachdev's (2022) study, which emphasized that technical-vocational specializations such as electrical installation are traditionally associated with male participation due to social and cultural perceptions regarding technical work.

Regarding the General Weighted Average (GWA), the largest group of respondents earned grades of 95 or higher, representing 38.5% of respondents. Only a small percentage earned grades between 75 and 80, and no student recorded a failing grade. These findings indicate that many students demonstrated excellent academic performance in EIM subjects. This aligns with Bulosan (2023), who explained that students with better academic performance often exhibit stronger practical competencies due to increased engagement and mastery of technical concepts.

**Table 1**
**Profile of the Respondents**
**N = 301**

| Sex | Frequency | Percentage |
|---|---|---|
| Male | 275 | 91.4 |
| Female | 26 | 8.6 |
| **General Weighted Average** | | |
| 74 Below | 0 | 0 |
| 75 - 80 | 21 | 7.0 |
| 81 - 85 | 85 | 28.2 |
| 86 - 94 | 79 | 26.2 |
| 95 above | 116 | 38.5 |
| **Family Monthly Income** | | |
| 10,000 below | 190 | 63.1 |
| 10,001 - 20,000 | 61 | 20.3 |
| 20,001 - 30,000 | 24 | 8.0 |
| 30,001 - 40,000 | 11 | 3.7 |
| 40,001 Above | 15 | 5.0 |

Regarding family monthly income, most respondents came from low-income households. About 63.1% reported a family monthly income of ₱10,000 or less. Only a small percentage fell into higher income brackets. These findings suggest that many EIM students come from economically disadvantaged families. Despite these conditions, students still pursue technical-vocational education because EIM specialization offers practical employment opportunities and faster entry into the workforce. This observation aligns with Dumaplin (2023), which emphasized that TVL programs are commonly chosen by students from lower-income families seeking practical, employable skills.

The respondents' profile suggests that competency development in EIM is influenced by both academic and socioeconomic factors. However, strong student participation despite economic limitations underscores the relevance and accessibility of TVL-EIM programs for workforce preparation.

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## Level of Competency in Performing Rough-In Activities, Wiring, and Cabling Works

The overall mean competency level for performing rough-in activities, wiring, and cabling for single-phase distribution, power, lighting, and auxiliary systems was 3.44, interpreted as Moderate Competency.

The findings showed that students demonstrated moderate competency in reading and interpreting electrical plans and diagrams, preparing tools and materials, installing conduits and fittings, pulling and cabling wires, terminating wires, and planning wiring layouts. Most respondents rated their competency as moderate or high.

Students demonstrated stronger competency in observing electrical safety standards while performing wiring and cabling work. This implies that safety practices are consistently emphasized during instruction and laboratory activities. Adherence to safety standards is essential in electrical installation because it prevents workplace accidents and ensures compliance with industry regulations.

However, some students still rated themselves low in performing wire pulling, preparing tools and materials efficiently, and completing rough-in work within the required time frame. These findings suggest that although students possess foundational technical knowledge, they still require additional practical exposure and repeated hands-on practice to improve efficiency and precision.

**Table 2**
**Level of Competency in Performing Rough-in Activities, Wiring and Cabling.**

| A. Performing rough-in activities, wiring and cabling works for single-phase distribution, power, lighting and auxiliary systems | Level of Competency | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| 1. I can read and interpret electrical plans and diagrams accurately. | 32 (10.6%) | 33 (11%) | **90 (29.9%)** | 83 (27.6%) | 63 (20.9%) |
| 2. I can prepare materials, tools, and equipment for rough-in activities efficiently. | 19 (16.3%) | 39 (13%) | **90 (29.9%)** | 72 (23.9%) | 81 (26.9%) |
| 3. I can install conduits and fittings neatly and according to specifications. | 11 (3.7%) | 51 (16.9%) | **101 (33.6%)** | 84 (27.9%) | 54 (17.9%) |
| 4. I can perform properly wire pulling and cabling for lighting and power systems. | 22 (7.3%) | 45 (15%) | 79 (26.2%) | **91 (30.2%)** | 64 (21.3%) |
| 5. I can terminate wires and cables according to standard color coding and labeling. | 17 (5.6%) | 45 (15%) | **93 (30.9%)** | 91 (30.2%) | 55 (18.3%) |
| 6. I can test continuity and insulation resistance after wiring installation. | 16 (5.3%) | 45 (15%) | **87 (28.9%)** | **87 (28.9%)** | 66 (21.9%) |
| 7. I can identify and correct wiring errors or defects. | 19 (6.3%) | 46 (15.3%) | **90 (29.9%)** | 83 (27.6%) | 63 (20.9%) |
| 8. I can observe electrical safety standards while doing wiring and cabling work. | 12 (4%) | 37 (12.3%) | 85 (28.2%) | **90 (29.9%)** | 77 (25.6%) |
| 9. I can plan the layout of wiring systems efficiently. | 18 (6%) | 36 (12%) | **98 (32.6%)** | 92 (30.6%) | 57 (18.9%) |
| 10. I can perform rough-in works within the given time frame | 16 (5.2%) | 43 (14.3%) | **108 (35.9%)** | 82 (27.2%) | 52 (17.3%) |
| Overall level of Competency | **3.44** | | **Moderate Competency** | | |

Note: The highest frequencies are in boldface.
Legend: 1 – Very Low Competency; 2 – Low Competency; 3 – Moderate Competency; 4 – High Competency; 5 – Very High Competency

The findings support the study by Caliba and Limpangog (2024), which revealed that competency in wiring and cabling improves when students are provided with sufficient laboratory practice, realistic work simulations, and direct supervision from instructors.

Overall, the moderate competency level indicates that students possess adequate foundational skills but still require reinforcement to achieve higher competency standards required by industry and TESDA certification.

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## Level of Competency in Installing Electrical Protective Devices

The overall mean competency level in installing electrical protective devices for distribution, power, lightning protection, and grounding systems was 3.48, interpreted as Moderate Competency.

Students showed moderate to high competency in installing circuit breakers and fuses, grounding systems, lightning protection systems, and following safety procedures during installation activities. Many respondents also demonstrated the ability to inspect and test protective devices for functionality.

The highest competency ratings were observed in the following safety protocols during the installation of protective devices. This implies that students understand the importance of safety compliance in electrical installation tasks.

Table 3
Level of Competency in Installing Electrical Protective Devices

| B. Installing electrical protective devices for distribution, power, lightning protection and grounding system | Level of Competency | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| 1. I can identify various types of electrical protective devices and their functions. | 39 (13%) | 42 (14%) | **90 (29.9%)** | 79 (26.2%) | 51 (16.9%) |
| 2. I can install circuit breakers and fuses correctly. | 12 (4%) | 47 (15.6%) | **83 (27.6%)** | 78 (25.9%) | 81 (26.9%) |
| 3. I can install grounding systems according to safety standards. | 11 (3.7%) | 52 (17.3%) | 69 (22.9%) | **97 (32.2%)** | 72 (23.9%) |
| 4. I can install lightning protection systems properly. | 17 (5.6%) | 43 (14.3%) | 82 (27.2%) | **98 (32.6%)** | 61 (20.3%) |
| 5. I can inspect and test electrical protective devices for functionality. | 17 (5.6%) | 43 (14.3%) | **87 (28.9%)** | 75 (24.9%) | 79 (26.2%) |
| 6. I can maintain and troubleshoot electrical protective systems. | 17 (5.6%) | 46 (15.3%) | **98 (32.6%)** | 79 (26.2%) | 61 (20.3%) |
| 7. I can follow safety protocols during installation of protective devices. | 17 (5.6%) | 40 (13.3%) | 56 (18.6%) | 87 (28.9%) | **101 (33.6%)** |
| 8. I can interpret diagrams and specifications for protective device installation. | 25 (8.3%) | 39 (13%) | 77 (25.6%) | **96 (31.9%)** | 64 (21.3%) |
| 9. I can connect grounding and bonding conductors correctly. | 17 (5.6%) | 41 (13.6%) | **95 (31.6%)** | 87 (28.9%) | 61 (20.3%) |
| 10. I can evaluate the effectiveness of installed protective systems. | 15 (5%) | 41 (13.6%) | **98 (32.6%)** | 84 (27.9%) | 63 (20.9%) |
| Overall Level of Competency | 3.48 | Moderate Competency | | | |

Note: The highest frequencies are in boldface.
Legend: 1 – Very Low Competency; 2 – Low Competency; 3 – Moderate Competency; 4 – High Competency; 5 – Very High Competency

Despite these strengths, students encountered challenges in interpreting technical specifications, troubleshooting electrical protective systems, and evaluating the effectiveness of installed systems. These areas involve analytical and diagnostic skills that typically require extensive practical experience and familiarity with industry-grade tools and equipment.

The findings are consistent with the observations of Bulosan (2023), who noted that EIM students often demonstrated weaker performance in grounding systems, protective coordination, and troubleshooting tasks because of limited practical exposure and insufficient equipment availability.

The results further imply that competency in installing protective devices requires more advanced technical application compared to basic wiring tasks. Therefore, schools must provide additional practical exercises focusing on testing procedures, troubleshooting methods, and grounding system installation.

## Level of Competency in Installing Wiring Devices

The respondents also demonstrated Moderate Competency in installing wiring devices such as floor-mounted and wall-mounted outlets, lighting fixtures, switches, and auxiliary outlets.

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Students showed competency in installing basic wiring devices and applying standard installation procedures. Most respondents were able to follow installation steps and comply with basic safety practices.

However, several respondents still experienced difficulties in troubleshooting wiring device installations, identifying installation defects, and ensuring proper device functionality after installation. These tasks require both theoretical understanding and practical familiarity with wiring systems.

The findings indicate that students still need greater exposure to practical simulations and competency-based performance assessments to improve their confidence and technical precision.

The results align with TESDA competency standards emphasizing the importance of repeated practice and performance-based training in mastering wiring device installation.

**Table 4**
**Level of Competency in Installing Wiring Devices**

| C. Installing wiring devices of floor and wall mounted outlet lighting fixture/switches and auxiliary outlet. | Level of Competency | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| 1. I can install lighting fixtures properly and securely. | 25 (8.3%) | 52 (17.3%) | 82 (27.2%) | **84 (27.9%)** | 58 (19.3%) |
| 2. I can install switches and outlets neatly and in correct positions. | 12 (4%) | 43 (14.3%) | **92 (30** | 89 (29.6%) | 65 (21.6%) |
| 3. I can connect outlets, switches, and lighting fixtures correctly based on wiring diagrams. | 26 (8.6%) | 31 (10.3%) | 79 (26.2%) | 81 (26.9%) | **84 (27.9%)** |
| 4. I can test and verify the operation of installed lighting fixtures and switches. | 17 (5.6%) | 30 (10%) | 93 (30.9%) | **97 (32.2%)** | 64 (21.3%) |
| 5. I can install fire detection and alarm system (FDAS). | 29 (9.6%) | 40 (13.3%) | **76 (25.2%)** | 84 (27.9%) | 72 (23.9%) |
| 6. I can identify defective and/or substandard electrical materials and report to immediate supervisor. | 10 (3.3%) | 44 (14.6%) | **99 (32.9%)** | 87 (28.9%) | 61 (20.3%) |
| 7. I can perform safe installation procedures for floor and wall outlets. | 16 (5.3%) | 44 (14.6%) | 82 (27.2%) | **97 (32.2%)** | 62 (20.6%) |
| 8. I can maintain cleanliness and orderliness during installation work. | 20 (6.6%) | 36 (12%) | 67 (22.3%) | 85 (28.2%) | **93 (30.9%)** |
| 9. I can troubleshoot faulty outlet or lighting fixture installations. | 22 (7.3%) | 44 (14.6%) | **94 (31.2%)** | 91 (30.2%) | 50 (16.6%) |
| 10. I can complete installation tasks efficiently with minimal supervision. | 22 (7.3%) | 44 (14.6%) | 83 (27.6%) | **96 (31.9%)** | 56 (18.6%) |
| Overall Level of Competency | 3.47 | Moderate Competency | | | |

Note: The highest frequencies are in boldface.
Legend: 1 – Very Low Competency; 2 – Low Competency; 3 – Moderate Competency;

Overall, the moderate competency level suggests that while students can perform basic installation procedures, they still require competency enhancement activities to meet higher industry expectations.

## Relationship Between Profile Variables and Competency Levels

The study revealed that sex does not have a significant relationship with students' competency levels in performing the three competency tasks. This finding implies that competency development is not determined by gender. Male and female students are equally capable of acquiring technical competencies when provided with equal learning opportunities and instructional support.

**Table 5**
**Relationship between the profile of the electrical installation and maintenance students in terms of sex and their level of competency in performing rough-in activities**

| Profile Variables | Chi-square Value ($\chi^2$) | df | p-value | Interpretation |
|---|---|---|---|---|
| Sex | 8.949 | 4 | .062 | Not Significant |

Legend: * Significant at .05

This finding is supported by the study of Limpangog and Caliba (2024), which found that both sexes typically achieved a "proficient" rating, meaning they met the national standards required for the National Certificate II (NC II) regardless of gender.

**Table 9**
**Relationship between the profile of the electrical installation and maintenance students in terms of sex and their level of competency in Installing wiring devices of floor and wall mounted outlet.**

| Profile Variable | Chi-square Value ($\chi^2$) | df | p-value | Interpretation |
|---|---|---|---|---|
| Sex | 6.351 | 4 | .174 | Not Significant |

On the other hand, General Weighted Average demonstrated a significant positive relationship with competency levels. Students with higher academic performance tended to

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E-ISSN: 3028-0842
P-ISSN: 3028-0834
Vol. 3 No. 3
DOI: https://doi.org/10.66206/eduheart.2026.334

achieve better practical competencies in rough-in activities, protective device installation, and wiring device installation.

The result suggests that academic achievement contributes positively to competency development because students who perform well academically are more likely to understand technical concepts, follow instructions accurately, and apply theoretical principles during practical activities.

This result is aligned with the study of Limpangog and Caliba (2023), which said that students with higher theoretical knowledge are generally better in practical skills.

On the other hand, monthly family income demonstrated only a weak relationship with competency levels. Although financial resources may influence access to learning materials and opportunities, the findings imply that competency development depends more strongly on other factors than on socioeconomic background alone.

The findings indicate that schools can still effectively develop competencies among economically disadvantaged students when appropriate instructional support and practical learning opportunities are provided.

**Table 7**
**Relationship between the Profile of the Electrical Installation and**

**Table 6**
**Relationship between the profile of the EIM students in terms of GWA and average family income and their level of competency in performing rough-in activities**

| Profile Variables | Correlation Coefficient | p-value | Interpretation |
|---|---|---|---|
| General Weighted Average | .252** | .000 | Significant |
| Average Family Income | -.142* | .013 | Significant |

**Table 8**
**Relationship between the Profile of the Electrical Installation and Maintenance Students in terms of GWA and family income and their Level of Competency in Installing Electrical Protective Devices**

| Profile Variables | Correlation Coefficient | p-value | Interpretation |
|---|---|---|---|
| General Weighted Average | .261** | .000 | Significant |
| Average Family Income | -.096 | .096 | Not Significant |

**Table 10**
**Relationship between the profile of the electrical installation and maintenance students in terms of GWA and family income and their level of competency in Installing wiring devices of floor and wall mounted outlet.**

| Profile Variables | Correlation Coefficient | p-value | Interpretation |
|---|---|---|---|
| General Weighted Average | .227** | .000 | Significant |
| Average Family Income | -.117* | .043 | Significant |

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

## Factors Affecting the Skill Gap Among EIM Students

Regression analysis revealed that student-related factors were the strongest predictors of competency development among EIM students. This means that student motivation, interest, engagement, discipline, attendance, and willingness to learn significantly influence practical skill acquisition.

Students who demonstrated strong motivation and active participation during laboratory activities tended to perform better in practical competencies. This finding supports the study of Ogbuanya and Adebayo (2021), which emphasized that learner engagement and self-efficacy significantly contribute to competency development in technical-vocational education.

**Table 11**
**Regression Analysis Results Predicting Competency Level in Rough-in activities, wiring and cabling**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .611 | .161 | | 3.783 | .000 |
| | Student-Related Factors | .338 | .064 | .351 | 5.325 | .000 |
| | Teacher- Related Factors | .145 | .067 | .156 | 2.148 | .033 |
| | Instructional- Related Factors | .211 | .082 | .208 | 2.573 | .011 |
| | Facilities/Equipment-Related Factors | .080 | .060 | .085 | 1.331 | .184 |

a. Dependent Variable: Competency Level 1

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Instructional-related factors also significantly affected competency levels. Effective teaching strategies, sufficient hands-on activities, clear demonstrations, and competency-based instruction positively influenced students' practical performance.

This implies that instructional delivery plays a critical role in helping students translate theoretical knowledge into actual workplace competencies. Students become more competent when teachers provide structured laboratory exercises, practical demonstrations, and competency-based activities.

**Table 12**
**Regression Analysis Results Predicting Competency Level in Installing Electrical Protective Devices**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .467 | .162 | | 2.888 | .004 |
| | Student-Related Factors | .438 | .064 | .437 | 6.876 | .000 |
| | Teacher- Related Factors | .146 | .067 | .152 | 2.170 | .031 |
| | Instructional- Related Factors | .161 | .082 | .153 | 1.958 | .051 |
| | Facilities/Equipment-Related Factors | .077 | .060 | .079 | 1.287 | .199 |

a. Dependent Variable: Competency Level 2

Teacher-related factors were likewise found to significantly predict competency development. Teachers who possess technical expertise, industry experience, and effective classroom management skills contribute positively to students' competency acquisition.

The findings support the World Bank (2023) and UNESCO-UNEVOC (2022), which emphasized that qualified instructors and continuous teacher development are essential in improving TVET outcomes.

Interestingly, facilities and equipment-related factors were not found to be significant predictors of competency levels. Although adequate facilities and equipment are important components of technical-vocational education, the findings suggest that student engagement and instructional quality exert stronger influence on competency development.

**Table 13**
**Regression Analysis Results Predicting Competency Level in Installing Wiring Devices**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .153 | .139 | | 1.096 | .274 |
| | Student-Related Factors | .514 | .055 | .509 | 9.381 | .000 |
| | Teacher- Related Factors | .132 | .058 | .136 | 2.275 | .024 |
| | Instructional- Related Factors | .208 | .071 | .196 | 2.941 | .004 |
| | Facilities/Equipment-Related Factors | .054 | .052 | .055 | 1.039 | .299 |

a. Dependent Variable: Competency Level 3

The result may also imply that even with limited resources, effective instructional strategies and strong student motivation can still produce satisfactory competency outcomes.

Overall, the findings confirm that competency development in EIM is influenced by a combination of learner characteristics, instructional quality, and teacher competence.

## CONCLUSIONS

Electrical Installation and Maintenance specialization remains predominantly male-dominated, and most students come from low-income households. EIM students demonstrated moderate competency in performing rough-in activities, installing electrical protective devices, and installing wiring devices.

Sex had no significant relationship with competency. While General Weighted Average significantly influenced the competency level.

Student-related factors were the strongest predictors of competency development, followed by instructional-related and teacher-related factors. Facilities and equipment, although important, were not significant predictors of competency.

There is a need to strengthen competency-based instruction, student engagement, and teacher development to reduce skill gaps among EIM students.

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## RECOMMENDATIONS

Based on the conclusions of the study, the following recommendations are offered:

1. Schools should intensify hands-on laboratory activities and competency-based training to strengthen practical skills among EIM students.
2. Teachers should undergo continuous professional development and industry immersion to remain updated with current industry standards and practices.
3. School administrators should support the implementation of competency enhancement programs focusing on student motivation, engagement, and practical exposure.
4. Students should be encouraged to actively participate in practical exercises, simulations, and competency assessments to improve their technical proficiency.
5. Future researchers may conduct similar studies involving larger samples and other TVL specializations to validate and expand the findings.

## ACKNOWLEDGMENTS

We express our gratitude to all who assisted in completing this research. We would also like to express our gratitude to our colleagues for their support, encouragement, and valuable comments over the entire process.

Ultimately, our families warrant gratitude for their patience and support throughout the whole process of this research.

## AI DECLARATION STATEMENT

AI-supported tools helped with grammar and structure in creating this article. No AI tools were used to collect, analyze, or interpret data; all authors are credited for their academic contributions.

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