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Development of Industrial Work Habits and Career Readiness among Vocational Students in Electrical Technology through Work-Integrated Learning (WiL)

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Abstract- This study examines the development of Industrial Habits and Career Readiness among vocational students majoring in Electrical Technology through participation in Work-Integrated Learning (WiL) programs. Employing a mixed-methods research design, the study collected quantitative data from 84 student interns using a 27-item behavioral questionnaire structured around nine core dimensions and rated on a five-point frequency scale. Complementary qualitative data were gathered from open-ended responses describing students' real-world learning experiences during workplace training. The quantitative results indicate that students demonstrated consistently high levels of behavioral development, with overall mean scores ranging from 4.40 to 4.71. Among the most prominent behaviors were demonstrates responsibility in performing assigned tasks ($\bar{x} = 4.71$) and Clear communication of tasks/problems to supervisors and colleagues and Reports to work on time as scheduled ($\bar{x} = 4.68$). The lowest-scoring behavior involved Avoiding unrelated personal activities (e.g., mobile phone use at work) ($\bar{x} = 3.92$), suggesting that this competency may require further attention. These results collectively highlight the positive impact of structured workplace training on students' professional readiness.

Qualitative findings further illustrate significant developmental gains across three major domains: teamwork and communication, responsibility and discipline, and advanced technical problem-solving. Students frequently reported substantial learning growth through engagement with complex technical challenges, such as diagnosing short circuits in electrical control cabinets and analyzing entire motor systems holistically rather than focusing on isolated components. These experiences enabled students to apply theoretical knowledge in authentic industrial contexts, thereby enhancing their confidence, accountability, and professional maturity. The combination of behavioral data and experiential insights supports the conclusion that the WiL model is highly effective in cultivating key professional competencies among Electrical Technology students. Overall, the program contributes meaningfully to students' preparedness for entering the industrial workforce by strengthening their technical communication abilities, work discipline, and capacity to solve real-world engineering problems.

Keywords: Work-Integrated Learning (WiL), Industrial Habits, Career Readiness, Electrical Technology, Technical Competency, Problem-Solving Skills.

I. Introduction

In today's rapidly evolving labor market, employers increasingly value graduates who possess not only technical expertise but also workplace readiness,particularly professional habits such as punctuality, responsibility, adaptability, and communication skills. Global reports show that skill mismatches persist across regions, with 63% of employers identifying skill shortages as a barrier to growth and over 267 million youth categorized as NEET (Not in Employment, Education, or Training) (UNESCO-UNEVOC, 2020).

Work-Integrated Learning (WiL) has emerged as a powerful approach to bridging the gap between school and work. WiL models, such as internships and dual training systems, offer students the opportunity to apply theoretical knowledge in real-world contexts while developing critical soft skills and professional identities (Jackson, 2015). Research shows that students who engage in WiL exhibit higher levels of employability and career clarity (OECD/UNESCO, 2016).

In Thailand, vocational education has long been challenged by low enrollment and perceptions of limited career value. However, recent reforms led by the Office of the Vocational Education Commission (OVEC) and implementation of Thailand's National Qualifications Framework (NQF) have emphasized competency-based education and closer industry collaboration (Ministry of Education, 2012; TPQI, 2014). WiL has become central to these reforms, aiming to produce graduates who meet both technical and behavioral expectations of employers (World Bank, 2018).

Specifically, in the context of Electrical Technology, Thailand recognizes the need for students not only to acquire knowledge of electrical systems, safety protocols, and troubleshooting skills, but also to develop

industrial work habits aligned with national and regional workforce demands. Through WiL initiatives, students in Electrical Technology programs are embedded within real industrial settings, enabling them to build essential competencies such as problem-solving under pressure, precision in technical tasks, and adherence to safety and regulatory standards. These outcomes are critical in addressing the skill mismatch and enhancing the employability of Thai vocational graduates, particularly in key sectors supporting Thailand's industrial development.

This study focuses on second-year vocational students in Electrical Technology from two Thai vocational institutes. It investigated how WiL contributes to the development of industrial work habits and career readiness, seeking to assess the effectiveness of this model in preparing students for meaningful employment.

Given Thailand's ambition to become a value-based, innovation-driven economy under the Thailand 4.0 strategy, strengthening vocational education is more critical than ever. The electrical and electronics sector, as one of the country's strategic industries, demands a new generation of technicians who are agile, disciplined, and capable of working with emerging technologies. Hence, the integration of WiL into the Electrical Technology curriculum not only serves academic goals but also aligns with national policies promoting economic competitiveness and human capital development. Understanding the outcomes of such learning models is essential to improving instructional practices and supporting Thailand's broader workforce development agenda.

II. Literature Review and Study Context

Work-Integrated Learning (WiL) is widely recognized as an effective educational approach for enhancing student employability and professional readiness. Jackson (2015) emphasizes that WiL helps students bridge academic knowledge with real-world work environments, allowing them to develop both technical competencies and essential soft skills. WiL models such as internships, cooperative education, and dual training have been adopted across various countries to address skill mismatches and better align graduates with labor market needs (OECD/UNESCO, 2016).

In vocational and technical education, the development of industrial work habits including punctuality, responsibility, discipline, and adaptability, is crucial for producing work-ready graduates. UNESCO-UNEVOC (2020) highlights that technical and vocational education and training (TVET) should promote not only occupational knowledge but also the values and attitudes essential for decent work. Employers globally continue to report deficits in these soft skills among new graduates (World Bank, 2018). The International Labour Organization (ILO) also stresses the importance of work-based learning to ensure that young people acquire practical experience and develop the work habits that align with the demands of modern economies (ILO, 2021).

WiL has shown strong potential in fostering not just employability but also learner engagement and career identity formation. Billett (2011) notes that workplace learning environments provide a unique cultural and social context in which students internalize the values of their profession through participation. Moreover, integrating reflective practice into WiL helps students analyze their workplace performance and identify areas for self-improvement (Smith, 2012). Studies conducted in Australia and Canada reveal that WiL participation contributes to increased student confidence, career clarity, and smoother transitions to full-time employment (Ferns & Zegwaard, 2014).

In Thailand, vocational education reforms have focused on integrating WiL into curricula to address issues of relevance and employability. The Ministry of Education, through the Office of the Vocational Education Commission (OVEC), has promoted competency-based training and industry collaboration (Ministry of Education, 2012). The Thailand Professional Qualification Institute (TPQI) also supports the alignment of educational outcomes with national occupational standards (TPQI, 2014). National initiatives such as the "School-in-Factory" model and dual vocational training schemes aim to institutionalize WiL in collaboration with private sector partners.

Despite these initiatives, challenges remain. Employers in Thailand often report that vocational graduates lack workplace discipline and problem-solving skills, pointing to a disconnect between school-based instruction and actual job demands (World Bank, 2018). As a result, national policy continues to prioritize experiential learning strategies that immerse students in real industry environments. The Twelfth National Economic and Social Development Plan (2017–2021) also emphasized the need for human capital development through technical skill-building and values formation, especially in fields critical to the country's infrastructure and industrial growth.

In the field of Electrical Technology, students are expected to master not only core technical skills but also to internalize safety awareness, teamwork, and professional responsibility—skills that are best cultivated in actual industrial settings. Prior studies show that students who experience well-structured WiL programs report higher confidence, improved job readiness, and stronger professional identities (Nuangpirom et al., 2023). Moreover, given the rapid changes in electrical and digital infrastructure, continuous exposure to workplace standards and innovations becomes essential for aligning vocational training with the needs of the digital economy.

This study is situated within this educational context, focusing on how WiL influences the work habits and career readiness of electrical vocational students in Thailand. Drawing from a synthesis of theoretical frameworks and prior research, five core dimensions were identified and operationalized into the study's questionnaire: (1) Responsibility and Punctuality, (2) Workplace Discipline and Safety Awareness, (3) Teamwork and Communication, (4) Problem-Solving and Adaptability, and (5) Career Awareness and Professional Identity. These dimensions reflect both global benchmarks for employability and competencies emphasized in Thailand's vocational standards and policy documents. It aims to contribute to the growing body of research on practice-based learning and to offer insights for policymakers, educators, and industry partners working to enhance the quality and outcomes of vocational education.

III. Materials and Methods / Methodology

This study adopted a mixed-methods research design combining quantitative and qualitative approaches to explore the development of industrial work habits and career readiness among vocational students in Electrical Technology through Work-Integrated Learning (WiL). The rationale for using a mixed-methods design was to obtain both measurable patterns and deeper insights into students' experiences, perceptions, and reflective practices during their workplace training.

3.1 Participants and Context

The research was conducted with eighty-four (N=84) second-year vocational students enrolled in the Electrical Technology program. The participants were drawn from two major vocational institutions in Thailand: The Institute of Vocational Education Central Region 3 and the Institute of Vocational Education Bangkok. All students were enrolled in a Work-Integrated Learning (WiL) program and had completed two semesters of industrial training placements at cooperating companies as part of their formal curriculum. These institutions are part of Thailand's national strategy to strengthen vocational education through partnerships with industry and implementation of competency-based training, in accordance with policies issued by the Office of the Vocational Education Commission (OVEC) and the Ministry of Education.

3.2 Research Instruments

Two primary instruments were used:

3.2.1 Quantitative Survey Questionnaire: Developed based on international frameworks of career readiness (NACE, 2022) and Industrial work habit dimensions drawn from prior studies (Jackson, 2015; Mabungela & Mtiki, 2024; Excelsior University, 2025). The questionnaire included Likert-scale items (1 = strongly disagree to 5 = strongly agree) grouped into five core dimensions:

1. Responsibility and Punctuality
2. Workplace Discipline and Safety Awareness
3. Teamwork and Communication
4. Problem-solving and Adaptability
5. Career Awareness and Professional Identity

The instrument was validated by three experts in vocational education and piloted before administration.

3.2.2 Open-Ended Interview Prompts and Reflective Questions: A set of two open-ended questions was included at the end of the survey to explore students' personal reflections on:

1. What specific habits or attitudes they felt had improved most during the WiL experience.
2. How ready they felt to enter full-time employment after graduation and what further development they believed they needed.

3.3 Data Collection Procedures

Quantitative data were collected through self-administered surveys at the end of the second internship semester. Students were briefed on the purpose of the study and informed consent was obtained. For the qualitative component, open-ended responses were collected alongside the survey and interpreted to triangulate quantitative findings.

3.4 Data Analysis

3.4.1 Quantitative Data: Descriptive statistics (mean, standard deviation) were used to assess overall trends across the five dimensions. Data were analyzed using SPSS to identify areas of strength and needed improvement in students' self-reported work habits and readiness.

3.4.2 Qualitative Data: Responses from open-ended questions were analyzed using **thematic content analysis**, focusing on recurring themes related to workplace experience, perceived growth, and future career orientation.

3.6 Methodological Justification

The chosen methodology draws on best practices found in prior WiL impact studies (e.g. Jackson, 2015; Nuangpirom et al., 2023; UNESCO, 2022), which emphasize both objective measures of workplace readiness and subjective reflections on habit formation. By combining standardized survey tools with reflective insights, the study ensures both breadth and depth of understanding into how WiL affects vocational students' preparation for industrial careers.

IV. Results and Discussion

4.1 Quantitative Results

This section presents the results of the mixed-methods study through both descriptive statistics and thematic qualitative analysis. The findings are interpreted through theoretical perspectives and national vocational education policy lenses.

4.2 Descriptive Statistics and Instrument Validity

The structured questionnaire included 27 behavioral indicators across 9 dimensions of industrial work habits and career readiness. It was administered to 84 second-year Electrical Technology students from the Central Region Vocational Education Institute 3 and Bangkok Vocational Education Institute. Using a 5-point frequency scale (1 = Never to 5 = Always), the overall mean was 4.43 (SD = 0.90), indicating high frequency of positive work-related behaviors.

Table 1: Summary of Top and Bottom Rated Behavioral Indicators

Item	Description	Mean	SD
Q7	Demonstrates responsibility in performing assigned tasks	4.71	0.78
Q19	Clear communication of tasks/problems to supervisors and colleagues	4.68	0.87
Q8	Reports to work on time as scheduled	4.68	0.82
Q5	Accepts responsibility and actively resolves errors when mistakes occur	4.62	0.85
Q17	Collaborates effectively with others to achieve shared objectives	4.62	0.82
Q25	Skilled use of electrical tools and instruments	4.62	0.81
Q3	Avoiding unrelated personal activities (e.g., mobile phone use at work)	3.92	1.34

The high scores in responsibility, teamwork, and communication reflect the positive behavioral transformation facilitated by WiL experiences. However, the lower mean and higher variance in Q3 suggest that managing distraction remains a challenge for some students.

4.3 Qualitative Data Interpretation

Open-ended responses revealed deep student reflections across four core areas:

- **Teamwork and Communication:** Students emphasized improved collaboration, task sharing, and customer-facing communication. They highlighted learning from senior colleagues and adopting appropriate communication styles.
- **Professional Responsibility and Discipline:** Punctuality, error correction, task completion, and consistent attendance emerged as hallmarks of workplace maturity.
- **Technical Proficiency and Tool Use:** Students described enhanced skills in using multimeters, vacuum pumps, and interpreting wiring diagrams in real tasks.
- **Problem-Solving and Adaptability:** Critical thinking developed through real challenges—such as diagnosing fire alarm faults, balancing electrical loads in MDBs, or repairing 3-phase motors—was cited as a turning point in their professional identity.

These qualitative insights support the value of situated learning (Brown et al., 1989) and underscore the role of authentic workplace immersion in identity development (Billett, 2011).

4.4 Theoretical and Policy-Based Discussion

WiL emerged as a transformative pedagogy bridging theoretical knowledge and behavioral readiness. High scores in responsibility and teamwork echo Jackson's (2015) assertion that professional identity is forged through authentic work experiences. Lower performance in distraction avoidance (Q3) suggests the need for stronger mentorship and behavioral coaching.

The qualitative findings reflect Billett's participatory learning theory, emphasizing workplace participation as key to identity reformation and behavioral evolution. This aligns with global TVET frameworks advocating for competency-based curricula that include reflective and collaborative learning components.

In Thailand, these findings support the policy direction of OVEC and TPQI toward dual-system vocational education. The behaviors most improved through WiL match those outlined in Thailand's vocational

competency standards: accountability, technical performance, collaboration, and adaptability. This validates the government's push for WiL expansion, including models like School-in-Factory (SIF).
Internationally, Thailand's case aligns with dual vocational training systems in Germany and Australia, where structured work placements are embedded into technical curricula. The success of these programs like the German Berufsbildung system shows that industrial immersion combined with guided reflection accelerates workplace readiness.

4.5 Implications and Practical Recommendations

The following implications arise:

- **Design Reflective Structures:** Journaling, debriefing, and critical incident logs should be standard to deepen learning from ambiguous or emergent scenarios.
- **Enhance Supervisor Training:** Workplace mentors should be oriented to provide formative, goal-based feedback aligned with student learning outcomes.
- **Integrate Learning Objectives with Work Tasks:** Assignments should be explicitly mapped to competency standards, ensuring a coherent learning journey.

In conclusion, WiL fosters holistic graduate development—not only through skill acquisition but also through attitudinal and behavioral transformation. For Electrical Technology students in Thailand, this translates into greater confidence, clarity, and competence in their professional pathways.

V. Conclusion

This study examined the impact of Work-Integrated Learning (WiL) on the development of industrial work habits and career readiness among second-year vocational students in Electrical Technology. Through a mixed-methods approach involving quantitative surveys and qualitative reflections, the research identified significant gains in student responsibility, teamwork, safety awareness, and professional identity.
The findings demonstrate that WiL serves as an effective educational strategy for aligning vocational training with real-world industry expectations. It not only enhances students' technical competencies but also cultivates essential soft skills and work ethics required in the modern workforce. Despite minor gaps in specific areas of problems-solving and adaptability the overall results affirm the value of immersive, structured workplace learning experiences in shaping career-ready graduates.
These conclusions support ongoing national efforts in Thailand to reform vocational education through industry collaboration and competency-based learning. The study offers practical insights for educators, policymakers, and employers seeking to strengthen the link between education and employment outcomes in technical fields.

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