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Assessing Industry Demands and Engineering Competencies in an Outcomes-Based Industrial Engineering On-the-Job Program

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Abstract. This study evaluates the alignment between industry labor-market demands and the Outcomes-Based Education (OBE) framework of the Industrial Engineering (IE) program at Quezon City University to improve technical preparation and on-the-job training (OJT) readiness. Specifically, it examines the attainment of engineering program outcomes such as the ability to apply mathematics and science to complex engineering problems, design and conduct experiments, interpret data, design systems within realistic constraints, function effectively in multidisciplinary teams, identify and solve engineering problems, communicate technical information, and use modern engineering tools and techniques. The study also evaluates the

achievement of course outcomes related to applying engineering theories to industrial problems, understanding plant operations and management control systems, developing responsible work attitudes, and demonstrating effective human relations in industrial settings. Furthermore, the study identifies labor-market expectations and technical training needs of IE graduates employed in selected manufacturing industries in the National Capital Region. Industry feedback highlighted the demand for skills in Lean Six Sigma, data analytics, industrial automation, PLC programming, ERP systems, process optimization, and technical reporting—competencies essential for Industry 4.0 environments. Using descriptive, quantitative, and qualitative approaches, data were analyzed using weighted means, frequency distributions, and percentage scores, and nonparametric statistical tools. Program documents, curriculum standards, and OJT portfolios were also examined. Findings provide evidence-based insights to enhance the engineering training curriculum, strengthen OJT program design, and ensure greater alignment between academic preparation and the evolving technical needs of industrial employers.

Keywords*: Outcomes-Based Education, On-the-Job Training, internship, labor market, Industrial Engineering, Quezon City University*

Introduction

The College of Engineering at Quezon City University aimed to strengthen its Outcome-Based Education (OBE) program in Industrial Engineering to meet the changing demands of the manufacturing labor market. Industry employers increasingly look for graduates who have advanced technical skills, adaptability, and the ability to work in competitive and quickly changing environments. Global trends support this need. Reports from the Rochester Institute of Technology (2025) indicated that the demand for industrial engineering graduates has remained steady and is expected to grow, while the United States Bureau of Labor Statistics projected nearly a 10 percent increase in employment for industrial engineers from 2021 to 2031. This growth is attributed to the field's versatility and the growing need for engineering expertise across sectors.

The OBE framework mandated through CHED Memorandum Order No. 96, s. 2017 served as a major foundation for improving Industrial Engineering programs. OBE emphasized the skills and competencies learners should demonstrate upon graduation, including the ability to solve complex engineering problems, design systems and conduct experiments, interpret data, function effectively in multidisciplinary teams, uphold ethical practice, and utilize modern engineering tools. Graduates were also expected to apply theories to real-world settings, understand plant operations, work responsibly, and maintain effective human relations in industrial environments.

In alignment with its mission to produce globally competent, ethical, and nationally committed graduates, Quezon City University recognized the need to reassess its OBE implementation. The rising expectations of employers, coupled with rapid industrial change, underscored the need to ensure that OJT students were adequately trained and prepared for workplace demands.

For this reason, the researchers conducted the study entitled "Labor Market

Demands of Industrial Companies to the OBE Program in the College of Engineering of Quezon City University: Input for the Training Needs of Industrial Engineering OJT Students." The study aimed to determine whether the current OJT program adequately responded to industry needs, identify areas for improvement, and provide insights for recalibrating the OBE curriculum.

This study was guided by a three-phase conceptual framework designed to evaluate the effectiveness and relevance of the Outcomes-Based Education (OBE) aligned On-the-Job Training (OJT) program for Industrial Engineering students in relation to labor market expectations. In the proactive phase, the researchers identified key issues in the existing OJT program, selected employed graduates as respondents, located their respective companies, and initiated coordination with relevant stakeholders. The active phase focused on the development and refinement of the research process, including proposal writing, partnership collaboration, creation of survey instruments, and drafting of major research components. The reactive phase involved analyzing labor market demand and formulating evidence-based recommendations to address future OJT students' training needs.

Specifically, the study examined the extent to which program outcomes were attained—such as the application of mathematics and science to engineering problems, experimental design and data interpretation, system and process design, teamwork, problem identification, ethical responsibility, communication proficiency, awareness of global and societal impacts, familiarity with contemporary issues, use of modern engineering tools, integration of engineering and management principles, and design of integrated systems involving people, materials, information, equipment, and energy. It also assessed the achievement of course outcomes, including the application of theoretical knowledge to industrial problems, familiarity with plant operations and management controls, development of responsible work attitudes and self-motivation, and enhancement of human relations in industrial settings. Finally, the study sought to identify current labor market demands and the specific training needs of Industrial Engineering graduates employed in selected manufacturing industries within the National Capital Region.

Methodology

This study used a mixed-method research design, specifically an explanatory descriptive approach, combining both descriptive-quantitative and descriptive-qualitative techniques. The quantitative part assessed how well the program and course outcomes were achieved, while the qualitative part offered contextual explanations that supported and clarified the numerical results. Combining these data sets enabled a more complete understanding of how the OBE-based OJT program matched current labor market demands.

Research Design

The descriptive-quantitative phase used percentage distribution and weighted mean analysis to assess respondents' evaluations of the OJT program. A descriptive-qualitative phase was employed to analyze, describe, and interpret

narrative responses, documentary materials, and OJT-related documents such as CHED CMO standards, syllabi, and curriculum requirements. Both data sets were then triangulated to ensure coherence and a deeper understanding of the program's relevance and effectiveness.

Respondents of the Study
The respondents were BSIE graduates who completed their On-the-Job Training during Academic Year 2024–2025. Prior permission to conduct the study was obtained from university officials, including the Dean and the BSIE Program Chairperson, as well as from the respondents. A 15-day period was allotted for answering and validating the survey. Pre-qualification ensured that only graduates with actual OJT experience and adequate knowledge participated.

A total of 54 BSIE graduates participated in the study. They completed their OJT in selected industrial and service companies within the National Capital Region.

Research Instrument
The primary research instrument was a self-report questionnaire administered electronically. As a self-report tool, the questionnaire required respondents to independently evaluate their OJT experiences, reflect on the attainability of program and course outcomes, and assess their preparedness for the labor market. This format allowed participants to answer honestly, at their own pace, and without external influence. The instrument contained three major parts:

1. Assessment of OJT Program Objectives
2. Assessment of OJT Course Outcomes
3. Identification of Labor Market Demands and Training Needs

The Likert-scale items and open-ended prompts enabled the gathering of both quantitative measures and qualitative insights.

To ensure quality and relevance, the instrument underwent calibration. The researchers consulted the BSIE Program Chairperson to review the appropriateness of the items and the adequacy of the content. A dry run was conducted among several employed BSIE graduates, whose feedback was used to refine unclear instructions, remove redundant questions, and ensure consistency with OBE standards. Calibration ensured that each item measured what it intended to measure and aligned with the program and course outcomes.

Data Gathering Procedure
After obtaining approval and validating the instrument, the survey questionnaire was disseminated online to the respondents. Assistance from faculty members who previously handled the students facilitated smooth distribution. Respondents were given fifteen (15) days to complete the instrument to ensure careful reading and accurate responses. At the end of the response period, the researchers collected, tallied, and prepared the data for analysis.

Data Procedures
The researchers themselves performed all stages of data preparation and analysis. Before statistical processing, the following data cleansing procedures were conducted:

1. Checking for completeness of all returned questionnaires.

2. Screening for inconsistent or patterned responses, which were flagged and examined.
3. Coding quantitative responses into numerical values for calculation.
4. Organizing qualitative responses into thematic categories for analysis.
5. Consolidating cleaned data into spreadsheet files for accurate computation and interpretation.

Data Analysis

Quantitative data were analyzed using the percentage formula and the weighted mean. Meanwhile, qualitative responses were analyzed using thematic interpretation. These qualitative findings were cross-referenced with documentary analysis of the OJT plans, program documents, curriculum, and the requirements of CHED CMO No. 101, S. 2017. The results from both qualitative and quantitative sources were integrated to develop a unified interpretation that directly addressed the study objectives.

Development Framework

The study followed a Three-Phase Model:

1. *Proactive Phase*
   Identification of issues in the OJT program, selection of graduate respondents, company mapping, coordination with stakeholders, and preliminary document review.

2. *Active Phase*
   Drafting the proposal, research components, survey instrument, and methodology; coordinating with collaborators; and preparing the analytical framework.

3. *Reactive Phase*
   Analyzing labor market demand, integrating findings, and formulating recommendations for improving the OJT preparation of Industrial Engineering students.

Results and Discussion

This section presents the study's findings, systematically analyzed and interpreted in relation to the research objectives. The results are organized to address the attainability of program and course outcomes for Industrial Engineering graduates, as well as the current labor market demands and training needs in selected manufacturing industries within the National Capital Region. Each set of data is examined in detail to highlight patterns, trends, and implications, providing a comprehensive understanding of the extent to which the program and course objectives have been achieved and their relevance to professional practice. The discussion integrates the findings with relevant literature and standards, offering insights into both theoretical and practical aspects of Industrial Engineering education and workforce preparedness.

Table 1.
Respondents' Assessment of OJT Program Outcome Attainability on Applying Mathematics and Science Knowledge in Solving Complex Engineering Problems (n = 50, WM ± SD, 95% CI)

Program Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program resulted to the respondent's ability to apply knowledge of mathematics…	2.90	AGREE
The OJT program resulted to the respondent's ability to apply knowledge in scientific method in workplace…	2.88	AGREE
Was able to apply the knowledge in solving complex engineering problems…	2.71	AGREE
TOTAL	**2.83**	**AGREE**

Table 1 above shows the respondents' assessment of the attainability of program outcomes related to the ability to apply knowledge of mathematics and science to solve complex engineering problems, based on fifty (50) respondents with a ± 2% margin of error and 95% confidence level. The assessment of the OBE OJT program outcome attainability regarding the ability to apply knowledge of mathematics and science to solve complex engineering problems revealed that item 1, "the OJT program resulted in the respondent's ability to apply knowledge of mathematics," had a weighted mean of 2.90 with a verbal interpretation of Agree. Additionally, the assessment of item 2 showed that the OJT program improved respondents' ability to apply scientific methods in the workplace, with a weighted mean of 2.88 and a verbal interpretation of 'Agree'. Furthermore, assessment of item 3 indicated that the OJT program enabled respondents to apply their knowledge to solve complex engineering problems, with a weighted mean of 2.71 and a verbal interpretation of Agree. This suggests that the respondents' overall assessment of the attainability of the program outcomes related to applying knowledge of mathematics and science to solve complex engineering problems is reflected in a total weighted mean of 2.83 (Agree), indicating that the program outcomes were generally attained.

Table 2
Assessment of Program Outcome Attainability Related to Designing and Conducting Experiments, and Analyzing and Interpreting Data
(n = 50; ±2% margin of error; 95% confidence level)

Program Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program enhanced the respondents' ability to design experiments.	2.88	Agree
The OJT program enhanced the respondents' ability to conduct experiments.	2.83	Agree
The OJT program improved the respondents' ability to analyze and interpret data.	2.11	Moderately Agree
Total Weighted Mean	**2.61**	**Agree**

Table 3 above shows the respondents' assessment of the attainability of program outcomes related to designing and conducting experiments, as well as analyzing and interpreting data. There were fifty (50) respondents with a ± 2% margin of error and a 95% confidence level. The assessment revealed that item 1, “The OJT program resulted in the respondent’s ability to design experiments,” had a weighted mean of 2.88, with a verbal interpretation of "Agree."

Additionally, item 2 showed that the OJT program improved respondents' ability to conduct experiments, with a weighted mean of 2.83 and a verbal interpretation of "Agree." Furthermore, item 3 indicated that respondents were moderately able to apply their knowledge to analyze and interpret data, with a weighted mean of 2.11 and a verbal interpretation of "Moderately Agree."

Overall, the assessment of respondents on the attainability of program outcomes related to designing and conducting experiments, as well as analyzing and interpreting data, yielded a total weighted mean of 2.61, or "Agree," suggesting that the program outcome was generally attained.

Table 3
Assessment of Program Outcome Attainability Related to Designing a System, Component, or Process Within Realistic Constraints
(n = 50; ±2% margin of error; 95% confidence level)

Program Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program improved the respondents’ ability to design systems.	1.72	Moderately Agree
The OJT program enhanced the respondents’ ability to design processes.	2.80	Agree
The OJT program strengthened the respondents’ ability to adopt social, ethical, health and safety, manufacturability, and sustainability considerations in accordance with standards.	2.75	Agree
Total Weighted Mean	**2.42**	**Moderately Agree**

Table 3 presents the respondents’ assessment of the attainability of program outcomes related to the ability to design a system, component, or process within realistic constraints. The results are based on responses from fifty (50) participants, evaluated at a ±2% margin of error and a 95% confidence level.

The respondents moderately agreed that the OJT program improved their ability to design systems, as reflected by a weighted mean of 1.72. They also agreed that the program enhanced their ability to design processes (M = 2.80). In addition, they agreed that the program strengthened their ability to integrate social, ethical, health and safety, manufacturability, and sustainability considerations in accordance with established standards (M = 2.75). Overall, the program outcome related to designing a system, component, or process within realistic constraints was

assessed as moderately attained, with a total weighted mean of 2.42.

These results suggest that while the OJT program was effective in developing students' capability to design processes and incorporate multidisciplinary constraints, further improvement may be needed to strengthen their competence in designing complete systems. Consistent with APA reporting standards, verbal interpretations were based on established statistical limits associated with the weighted mean scale used in the study.

Table 4

Assessment of Respondents on the Attainability of Program Outcomes Related to the Ability to Function on Multidisciplinary Teams
(n = 50; ±2% margin of error; 95% confidence level)

Program Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program improved the respondents' ability to function on multidisciplinary teams.	2.77	Agree
The OJT program enhanced the respondents' ability to share knowledge that contributes to team objectives.	1.80	Moderately Agree
The OJT program strengthened the respondents' ability to share experiences that contribute to team objectives.	2.89	Agree
Total Weighted Mean	**2.49**	**Moderately Agree**

Table 4 presents the respondents' assessment of the attainability of program outcomes related to their ability to function on multidisciplinary teams (Author, Year). The results were based on the responses of fifty (50) participants, evaluated within a ±2% margin of error and a 95% confidence level.

The respondents agreed that the OJT program improved their ability to function effectively on multidisciplinary teams, as reflected in the weighted mean of 2.77. They moderately agreed that the program enhanced their ability to share knowledge that contributed to the team's objectives (M = 1.80). In addition, they agreed that the OJT experience strengthened their ability to share relevant experiences that supported the team's goals (M = 2.89).

Overall, the program outcome was assessed as moderately attained, indicated by the total weighted mean of 2.49. These findings suggested that the OJT program played a meaningful role in developing collaboration skills, particularly in integrating diverse experiences within team settings. However, the moderate rating for knowledge-sharing ability implied that some students may still have needed more confidence or exposure to fully contribute their academic insights during team activities.

Table 5

Assessment of Respondents on the Attainability of Program Outcomes Related to the Ability to Identify, Formulate, and Solve Complex Engineering Problems

Program Outcome Indicator	Weighted	Verbal

	Mean	Interpretation
The OJT program improved the respondents' ability to identify complex engineering problems.	2.60	Agree
The OJT program enhanced the respondents' ability to formulate complex engineering problems.	2.78	Agree
The OJT program strengthened the respondents' ability to solve complex engineering problems.	1.76	Moderately Agree
Total Weighted Mean	**2.38**	**Moderately Agree**

Table 5 presents the respondents' assessment of the attainability of program outcomes related to their ability to identify, formulate, and solve complex engineering problems (Author, Year). The results were drawn from fifty (50) participants, evaluated within a ±2% margin of error and a 95% confidence level.

The respondents agreed that the OJT program improved their ability to identify complex engineering problems, as indicated by a weighted mean of 2.60. They also agreed that the program enhanced their ability to formulate these problems, reflected in the weighted mean of 2.78. However, their ability to solve complex engineering problems received a moderately agreeable rating (M = 1.76), suggesting that while students recognized and articulated complex issues, they were less confident in fully resolving them during the OJT experience.

Overall, the weighted mean of 2.38 indicated that the program outcome was moderately achieved. This implied that although the OJT program provided meaningful exposure to real-world engineering challenges, students may have needed additional opportunities to practice problem-solving at a deeper, more technical level.

Table 6

Assessment of Respondents on the Attainability of Program Outcomes Related to the Understanding of Professional and Ethical Responsibility

OBE OJT Program Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program improved the respondents' understanding of professional responsibility.	2.69	Agree
The OJT program enhanced the respondents' understanding of ethical responsibility.	2.78	Agree
The OJT program strengthened the respondents' ability to relate and adjust to appropriate human behavior in a team.	2.84	Agree
Total Weighted Mean	**2.77**	**Agree**

Table 6 shows how respondents viewed the achievability of program outcomes related to their understanding of professional and ethical responsibility during the OJT program. Overall, participants rated this outcome positively, with a total weighted mean of 2.77, which was interpreted as Agree. This suggests that the respondents believed the OJT program effectively supported their growth in this area.

Among the indicators, the highest rating was recorded for respondents' ability to relate to and adjust to appropriate human behavior in a team (WM = 2.84, Agree). This suggests that field exposure allowed trainees to practice interpersonal skills, workplace decorum, and ethical interactions with colleagues. This finding aligns with previous studies emphasizing that internship experiences provide real-world contexts where learners develop behavioral maturity and ethical judgment (Kolb, 2015).

The indicator for understanding ethical responsibility also received a high rating (WM = 2.78, Agree). This suggests that the OJT environment helped respondents recognize ethical standards, workplace rules, and professional norms in real-world practice. Such exposure is considered vital in engineering programs, where students are expected to internalize ethical decision-making as part of their professional training (ABET, 2022). Lastly, the understanding of professional responsibility earned a weighted mean of 2.69 (Agree). Although slightly lower than the other items, this rating still indicates that respondents viewed the OJT program as influential in increasing their awareness of duties, accountability, and expected conduct in the engineering field.

Table 7
Assessment of Respondents on the Attainability of Program Outcomes Related to Ability to Communicate Effectively

OBE OJT Program Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program resulted to the respondents Ability to write a narrative report about ongoing issues in the workplace…	2.82	Agree
Ability to analyze specific issues and communicate possible solution…	1.74	Moderately Agree
Ability to suggest better options to improve performance within the team and to the upper management level…	2.65	Agree
Total Weighted Mean	**2.37**	**Moderately Agree**

Table 7 showed the respondents' assessment of the likelihood of achieving program outcomes related to their ability to communicate effectively (Author, Year). The results were based on the responses of fifty (50) participants, evaluated with a ±2% margin of error and a 95% confidence level.

The respondents agreed that the OJT program improved their ability to write narrative reports about ongoing workplace issues, as reflected by a weighted mean of 2.82. They moderately agreed that the program enhanced their ability to analyze the specific problems and communicate possible solutions (M = 1.74). Additionally, they agreed that the program strengthened their ability to suggest better options for improving team performance and communicating with upper management (M = 2.65).

Overall, the total weighted mean of 2.37 indicated that the program outcome was

moderately achieved. These findings suggest that while the OJT program offered valuable exposure to workplace communication, some students still need additional practice in analyzing complex problems and conveying solutions effectively. This underscores the importance of structured guidance, feedback, and opportunities to practice professional communication skills during field training, as effective communication is a vital competency in engineering practice (ABET, 2022).

Table 8

Assessment of Respondents on the Attainability of Program Outcomes Related to Broad Education for Understanding the Impact of Engineering Solutions in Global, Economic, Environmental, and Societal Contexts

OBE OJT Program Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program provided respondents with broad education necessary to understand the impact of engineering solutions in a global context.	2.94	Agree
The OJT program enhanced respondents' broad education necessary to understand the impact of engineering solutions in economic and environmental contexts.	2.83	Agree
The OJT program strengthened respondents' broad education necessary to understand the impact of engineering solutions in societal contexts.	2.77	Agree
Total Weighted Mean	**2.85**	**Agree**

Table 8 showed the respondents' assessment of how achievable program outcomes related to broad education are for understanding the impact of engineering solutions in global, economic, environmental, and societal contexts (Author, Year). The evaluation was based on fifty (50) respondents, with a ±2% margin of error and a 95% confidence level. The respondents agreed that the OJT program provided them with the broad education needed to understand the impact of engineering solutions in a global context (WM = 2.94). They also agreed that the program improved their understanding of the economic and environmental aspects of engineering solutions (WM = 2.83), and that it increased their knowledge of the societal impact of engineering solutions (WM = 2.77). Overall, the total weighted mean of 2.85 indicated that this program outcome was achieved. These results suggest that the OJT program successfully exposed students to the wider implications of engineering decisions, highlighting the importance of considering environmental sustainability, economic feasibility, and societal welfare in professional practice. This aligns with the goals of engineering education, which aim to produce graduates who can apply technical knowledge in a broad, real-world context (ABET, 2022).

Table 9
Assessment of Respondents on the Attainability of Program Outcomes Related to Knowledge of Contemporary Issues

OBE OJT Program Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program improved the respondents' consciousness of contemporary issues.	2.89	Agree
The OJT program enhanced the respondents' ability to apply knowledge to contemporary issues.	2.93	Agree
The OJT program strengthened the respondents' ability to share actual workplace experiences related to contemporary issues.	2.67	Agree
Total Weighted Mean	**2.83**	**Agree**

Table 9 showed the respondents' assessment of how well the program outcomes related to knowledge of current issues were achieved (Author, Year). The evaluation involved fifty (50) respondents, with a ±2% margin of error and a 95% confidence level. The respondents agreed that the OJT program increased their awareness of current issues in the engineering field, reflected by a weighted mean of 2.89. They also agreed that the program improved their ability to apply knowledge to current issues (WM = 2.93) and strengthened their ability to share real workplace experiences related to these issues (WM = 2.67). Overall, the total weighted mean of 2.83 indicated that this program outcome was generally accomplished. These results suggest that the OJT program gave students practical exposure to contemporary challenges in engineering, allowing them to connect theoretical knowledge with real-world applications. This engagement aligns with experiential learning principles, where students actively apply knowledge to current issues, fostering critical thinking and problem-solving skills in professional settings (Kolb, 2015; ABET, 2022).

Table 10
Assessment of Respondents on the Attainability of Program Outcomes Related to the Ability to Use Techniques, Skills, and Modern Engineering Tools

OBE OJT Program Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program enhanced the respondents' ability to use techniques necessary for engineering practice.	2.78	Agree
The OJT program improved the respondents' ability to use skills necessary for engineering practice.	2.69	Agree
The OJT program strengthened the respondents' ability to use modern engineering tools necessary for engineering practice.	2.83	Agree
Total Weighted Mean	**2.78**	**Agree**

Table 10 showed the respondents' assessment of the achievability of program outcomes related to the ability to use techniques, skills, and modern engineering tools in engineering practice (Author, Year). The assessment was conducted with fifty (50) respondents at a ±2% margin of error and a 95% confidence level. The respondents agreed that the OJT program improved their ability to use techniques necessary for engineering practice (WM = 2.78). They also agreed that it enhanced their ability to apply skills needed for engineering tasks (WM = 2.69). Furthermore, they agreed that the program increased their competence in using modern engineering tools essential for professional practice (WM = 2.83). Overall, a total weighted mean of 2.78 indicated that this program outcome was achieved. These findings suggest that the OJT program provided practical exposure that enabled respondents to integrate technical skills, modern tools, and applied techniques in realistic engineering scenarios. This supports the idea that experiential learning in professional settings improves students' readiness to perform effectively in modern engineering workplaces (Kolb, 2015; ABET, 2022).

Table 11

Assessment of Respondents on the Attainability of Program Outcomes Related to Knowledge and Understanding of Engineering and Management Principles as a Member and Leader in a Team

OBE OJT Program Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program resulted in the respondents' enhancement of knowledge on engineering and management principles as a member in a team …	2.72	Agree
Understanding on engineering and management principles as a member in a team, to manage projects and in multidisciplinary environments…	2.66	Agree
Knowledge and understanding on engineering and management principles as a leader in a team, to manage projects and in multidisciplinary environments …	2.89	Agree
Total Weighted Mean	**2.76**	**Agree**

Table 11 showed the respondents' assessment of how achievable the program outcomes related to knowledge and understanding of engineering and management principles are as a team member and leader (Author, Year). The assessment included fifty (50) respondents, evaluated with a ±2% margin of error and a 95% confidence level. The respondents agreed that the OJT program improved their knowledge of engineering and management principles as team members (WM = 2.72). They also agreed that the program enhanced their understanding of these principles for managing projects in multidisciplinary environments as team members (WM = 2.66). Additionally, the respondents agreed that the program strengthened their knowledge and understanding as leaders in a team, enabling them to manage projects and collaborate efficiently in multidisciplinary settings (WM = 2.89). Overall, the total weighted mean of 2.76

indicated that this program outcome was achieved. These results suggest that the OJT program gave students opportunities to develop both managerial and technical skills within team settings. Exposure to team-based projects and leadership roles helped participants combine engineering knowledge with management principles, preparing them for real-world professional challenges (ABET, 2022; Kolb, 2015).

Table 12
Assessment of Respondents on the Attainability of Program Outcomes Related to the Ability to Design, Develop, Implement, and Improve Integrated Systems

OBE OJT Program Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program resulted in the respondents' ability to design and develop integrated systems…	1.91	Moderately Agree
Ability to implement integrated systems that include people, materials, information, equipment and energy…	2.75	Agree
Ability to improve integrated systems that include people, materials, information, equipment and energy…	2.82	Agree
Total Weighted Mean	**2.50**	**Agree**

Table 12 presented the respondents' assessment of the attainability of program outcomes related to designing, developing, implementing, and improving integrated systems (Author, Year). The evaluation involved fifty (50) respondents, with a ±2% margin of error and a 95% confidence level. The respondents moderately agreed that the OJT program enhanced their ability to design and develop integrated systems (WM = 1.91). They agreed that it improved their ability to implement integrated systems, which include people, materials, information, equipment, and energy (WM = 2.75). Similarly, the respondents agreed that the program strengthened their ability to improve integrated systems (WM = 2.82). Overall, the total weighted mean of 2.50 indicated that this program outcome was attained. These results suggested that the OJT program provided students with practical exposure to integrated system design and management, though the lower mean for system design highlighted a potential area for further skill development. This finding aligns with experiential learning principles, emphasizing that hands-on application of system design and improvement fosters critical thinking and problem-solving skills in complex engineering environments (Kolb, 2015; ABET, 2022).

Table 13

Assessment of Respondents on the Attainability of Course Outcomes Related to the Application of Theories Learned in School to Actual Technical and Practical Solutions in Industrial Problems

OBE OJT Course Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program resulted in the respondents' theories learned in school to the actual technical performance in the workplace…	2.78	Agree
Ability to apply theories learned in the workplace…	2.63	Agree
Ability to apply practical solutions to industrial problems in the workplace…	2.84	Agree
Total Weighted Mean	**2.75**	**Agree**

Table 13 shows respondents' evaluation of whether they can apply theories learned in school to real-world technical and practical solutions for industrial problems (Author, Year). The assessment involved fifty (50) respondents, with a margin of error of ±2% and a 95% confidence level. The respondents agreed that the OJT program helped them apply theories learned in school to actual technical work (WM = 2.78). They also agreed that it improved their ability to use theories effectively in workplace scenarios (WM = 2.63). Additionally, the respondents agreed that the program increased their capacity to develop practical solutions for industrial problems (WM = 2.84). Overall, the total weighted mean of 2.75 indicates that this course outcome was achieved. These results suggest that the OJT program effectively bridged the gap between theoretical knowledge and practical application, equipping respondents with skills to turn classroom learning into practical workplace solutions. This aligns with experiential learning theories that highlight the importance of integrating knowledge and practice for professional competence (Kolb, 2015; ABET, 2022).

Table 14

Assessment of Respondents on the Attainability of Course Outcomes Related to Familiarization with Varied Plant Operations, Operational Techniques, and Current Management Control

OBE OJT Course Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program resulted in the respondents' familiarization with varied plant operations and processes…	2.76	Agree
Familiarization with operational techniques used in the workplace…	2.88	Agree
Familiarization with current management control of technical operation in the workplace…	1.83	M Agree
Total Weighted Mean	**2.49**	**Moderately Agree**

Table 14 presented the respondents' assessment of how achievable the course outcomes related to familiarization with various plant operations, operational techniques, and current management control are (Author, Year). The assessment involved fifty (50) respondents, evaluated with a margin of error of ±2% and a 95% confidence level.

The respondents agreed that the OJT program improved their familiarity with different plant operations and processes (WM = 2.76). They also agreed that it enhanced their understanding of operational techniques used in the workplace (WM = 2.88). However, the respondents only moderately agreed that the program strengthened their knowledge of current management control of technical operations (WM = 1.83).

Overall, the combined weighted mean of 2.49 indicated that this course outcome was moderately achieved. These findings suggest that while the OJT program effectively exposed respondents to plant operations and operational techniques, further reinforcement is needed to improve understanding of management control systems. This result aligns with experiential learning theories, which argue that complex managerial skills are developed gradually through hands-on experience and guided practice (Kolb, 2015; ABET, 2022).

Table 15

Assessment of Respondents on Attainability of Course Outcomes Relative to the Development of Responsible Attitude and Self-Motivation by Systematically Handling Tasks in Design and Other Activities Relevant to Industrial Engineering

OBE OJT Course Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program developed the respondents' responsible attitude in the workplace.	2.89	Agree
The OJT program enhanced the respondents' self-motivation to work actively and energetically to achieve goals.	2.63	Agree
The OJT program strengthened the respondents' responsible attitude and self-motivation by systematically handling tasks in design and other activities relevant to Industrial Engineering.	2.65	Agree
Total Weighted Mean	**2.72**	**Agree**

Table 15 shows the respondents' assessment of how achievable the course outcomes are concerning the development of a responsible attitude and self-motivation through systematically handling tasks in design and other Industrial Engineering activities. A total of fifty (50) respondents participated in the evaluation, with a ±2% margin of error and a 95% confidence level. The respondents agreed that the OJT program contributed to developing their responsible attitude in the workplace (WM = 2.89). They also agreed that the

program boosted their self-motivation to work actively and energetically toward reaching goals (WM = 2.63). Similarly, they agreed that the OJT experience strengthened their responsible attitude and self-motivation by systematically managing tasks in design and other activities relevant to Industrial Engineering (WM = 2.65). Overall, the total weighted mean of 2.72 suggests that this course outcome was generally achieved. These findings align with experiential and outcomes-based education principles, emphasizing that structured workplace immersion promotes professional behavior, work ethics, and responsible task management—essential skills valued in engineering practice (Kolb, 2015; ABET, 2022).

Table 16

Assessment of Respondents on Attainability of Course Outcomes Relative to the Development of Good Human Relations in Industrial Operations

OBE OJT Course Outcome Indicator	Weighted Mean	Verbal Interpretation
The OJT program resulted in the respondents' personal development of good human relations in the workplace.	2.65	Agree
The respondents demonstrated a positive attitude that influenced fellow workers inside and outside the company.	2.74	Agree
The respondents were able to demonstrate a self-initiating habit to influence fellow workers, which is essential in the labor market.	2.68	Agree
Total Weighted Mean	**2.69**	**Agree**

Table 16 shows respondents' assessments of the achievability of course outcomes related to developing good human relations in industrial operations. A total of fifty (50) respondents participated in the evaluation, with a margin of error of about ±2% and a confidence level of 95%. The respondents agreed that the OJT program supported their personal development of good human relations at work (WM = 2.65). They also agreed that the program helped them show a positive attitude that influenced colleagues inside and outside the company (WM = 2.74). Additionally, they agreed that the OJT experience improved their ability to demonstrate a self-starting habit to influence coworkers, a skill considered essential in the job market (WM = 2.68). Overall, the total weighted mean of 2.69 suggests that this course outcome was generally achieved. These results align with literature that emphasizes the importance of interpersonal skills, communication, and positive workplace behavior as key parts of professional readiness and employability in engineering and industrial settings (Kolb, 2015; ABET, 2022).

Table 17

Assessment of Current Labor Market Demand and Training Needs for Industrial Engineering Graduates Employed in Selected Manufacturing Industries

Rank	Statements	f	%
1	A graduate with inherent punctuality, preparedness, self-initiating habits, and willingness to work overtime when needed.	20	40.00%
2	Knowledgeable in the application of Program Evaluation and Review Technique (PERT) in industrial engineering operations.	10	20.00%
3	Knowledgeable in manufacturing optimization techniques using linear programming models to improve performance and productivity.	8	16.00%
4	Possesses inherent technical, analytical, and soft skills aligned with evolving global industry demands.	7	14.00%
5	Proficient in written and oral technical report writing, particularly in line production manufacturing issues and concerns.	5	10.00%
	Total	**50**	**100.00%**

Table 17 shows the assessment of current labor market demands and the related training needs for Industrial Engineering graduates working in selected manufacturing industries in the National Capital Region. The results, based on fifty respondents, highlight the skills most valued by manufacturing firms.

Rank 1 indicates that employers prioritize graduates who demonstrate punctuality, preparedness, self-initiative, and a willingness to work overtime when needed, with a frequency of 20, representing 40.00% of respondents.

Rank 2 reveals that firms value graduates knowledgeable in applying the Program Evaluation and Review Technique (PERT) in industrial engineering operations, supported by a frequency of 10 (20.00%).

Rank 3 corresponds to the demand for graduates skilled in manufacturing optimization techniques, especially using linear programming models to improve performance and productivity, with a frequency of 8 (16.00%).

Rank 4 highlights the need for graduates with strong technical, analytical, and soft skills, adapted to changing global industry demands, with a frequency of 7 (14.00%).

Finally, Rank 5 shows that companies also seek graduates proficient in both written and oral technical report writing, particularly those trained to address line production and manufacturing issues, with a frequency of 5 (10.00%).

These findings suggest that, beyond technical knowledge, workplace attitude, soft skills, and operational abilities remain key factors affecting employability in the manufacturing sector.

Table 18
Training Needs for Entering BSIE Graduates Prior to Job Employment

Rank	Statements	f	%
1	Newly graduate of Industrial Engineering needs to be trained in Lean Six Sigma prior to entering the job market.	15	30.00%
2	Training on development and formulation of data analytics models using Excel or Power Business Intelligence.	12	24.00%
3	Training on industrial automation and Programmable Logic Control applications.	9	18.00%
4	Enterprise Resource Planning is an integrated software platform that helps manufacturing operations and automates industrial processes across departments.	8	16.00%
5	For effective and safe data security operation, IE graduates need training on cybersecurity awareness for manufacturing systems.	6	12.00%
	Total (50 respondents)	**50**	**100.00%**

Table 18 presents the assessment of the training needs required for entering BSIE graduates before job employment, based on the responses of 50 participants. The highest-ranked need is Lean Six Sigma training, highlighted by fifteen (15) respondents or 30.00%, reflecting the importance of quality and process improvement skills in industry. This is followed by training in data analytics using Excel or Power BI, with twelve (12) respondents or 24.00%, underscoring the growing demand for data-driven competencies.

Ranked third is training on industrial automation and PLC applications, cited by nine (9) respondents or 18.00%, showing the increasing relevance of automated systems in modern manufacturing. Enterprise Resource Planning (ERP) training follows with eight (8) respondents or 16.00%, highlighting the need for graduates to understand integrated operational systems. Lastly, six (6) respondents or 12.00% identified cybersecurity awareness for manufacturing systems as essential, reflecting the emerging importance of protecting digital industrial environments.

Conclusion

The study's findings reveal that while Industrial Engineering students attained most OBE-aligned program outcomes during their OJT—such as the application of mathematics and science to engineering tasks, effective teamwork, ethical responsibility, workplace communication, and awareness of the broader impacts of engineering solutions—several higher-level competencies were only moderately developed. These include system design, complex problem solving, advanced data analysis, and the ability to articulate and share technical knowledge. This indicates that although the OJT program successfully develops foundational engineering skills, it provides limited opportunities for students to engage in more complex, higher-order engineering functions. To address this gap, the OJT program should strengthen its structure by enhancing coordination with host companies, ensuring that students are exposed to more challenging engineering tasks, and encouraging mentors to assign projects that require

deeper technical analysis and system-level thinking.

Similarly, course outcomes were met mainly, as students effectively translated theoretical learning into practical industrial activities, improved their familiarity with plant processes, and developed responsible work attitudes, self-motivation, and strong interpersonal skills—competencies consistent with experiential learning models. However, the moderate attainment of management control system competencies suggests that students need more structured exposure to supervisory and managerial functions. This can be improved by integrating supplemental training modules on plant management, quality systems, and operations oversight, or by establishing rotational assignments within OJT placements to broaden managerial awareness.

The study also highlights that labor market demands prioritize graduates who exhibit strong work ethics, punctuality, initiative, and adaptability, along with technical competencies such as PERT application, manufacturing optimization, analytical reasoning, and technical report writing. At the same time, industries increasingly value emerging skills in Lean Six Sigma, data analytics, industrial automation, ERP systems, and cybersecurity—reflecting the rapid digitalization of the industrial sector. These findings underscore the need to recalibrate the curriculum and align training programs with Industry 4.0 requirements by integrating relevant certifications, advanced technical modules, and partnerships with companies offering digital manufacturing and data-driven tools. Strengthening soft skills training, enhancing students' exposure to modern engineering technologies, and expanding industry collaborations will further ensure that graduates remain competitive and industry-ready. Continuous program evaluation through tracer studies and employer feedback is also essential to maintain long-term responsiveness to evolving labor market needs.

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