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Jeffrey L. Cacho

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LABOR MARKET DEMAND 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
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Abstract.

Low-volume manufacturing presents distinct operational challenges, including inefficiencies and production delays that can hinder productivity and limit output. This study investigates the manufacturing process of Peppermint Tailoring, a company engaged in low-volume T-shirt production, to identify and address inefficiencies using operations research and industrial engineering tools. Despite the prevalence of low-volume enterprises, literature addressing tailored process improvement strategies for such contexts remains limited.

The research adopted a descriptive quantitative design, integrated with a case study approach. Key methodologies included time-and-motion studies, Fishbone Diagrams, and discrete-event simulation via ProModel. Data collection focused on measuring standard and actual task times to calculate production efficiency and assess resource utilization. Two alternative facility layouts were proposed and evaluated through simulation modeling.

The initial production efficiency of Peppermint Tailoring was recorded at 73.08%. Following the implementation of the first proposed layout, efficiency rose significantly to 89.23%, while the second alternative achieved an 84.62% efficiency rate. The improvements were primarily attributed to strategic reallocation of worker tasks and redesigning the facility layout, which led to reduced idle time and enhanced workflow. Simulation outputs confirmed increased utilization rates and shortened task completion times.

The study concludes that suboptimal facility arrangements and task allocations were the main contributors to production inefficiencies. The implemented interventions resulted in substantial improvements, validating the applicability of operations research and industrial engineering techniques in low-volume settings. The researchers recommend continuous monitoring, iterative facility layout evaluation, and worker-centered process enhancements to maintain and further improve operational efficiency.

Keywords: low-volume manufacturing, production efficiency, industrial engineering, facility layout, operations research, time-and-motion study, simulation modeling, task allocation, process improvement, ProModel, Case Study Approach; Facility Layout; Line Balancing, Qualitative Approach; Operations Research

Introduction

Improvement and facilitation of the product introduction process in low-volume manufacturing industries required tailored solutions specific to their operational contexts (Afonso et al., 2018; Narayanamurthy & Gurumurthy, 2016). These needs, often associated with distinct product characteristics and production systems, stemmed from the fundamental differences between low-volume and high-volume manufacturing environments. Consequently, it was crucial to differentiate between these manufacturing types by highlighting their respective operational features. Understanding how these distinctions affected the product introduction process allowed for more effective and efficient improvement strategies within low-volume firms. This understanding enabled the development of specialized approaches to streamline the product introduction process and address delays.

Recent studies have indicated a persistent gap in literature focused on the product introduction process in low-volume manufacturing industries (Zhan et al., 2021; Afonso et al., 2018). These findings emphasized the need to investigate how the unique traits of such industries influenced their production systems and how improvements could be aligned with those influences. The present study aimed to apply Industrial Engineering methodologies to mitigate production delays and improve operational efficiency at Peppermint Tailoring. A time and motion study were employed to calculate each worker's standard time, basic time, and allowance factor. Interviews with production staff were conducted to identify the root causes of inefficiencies.

Research Questions

Based on the identified operational inefficiencies and workplace concerns at Peppermint Tailoring, the study aims to address the following research questions:

RQ1: What factors contribute to the low production efficiency rate (73.08%) observed in the current manufacturing system of Peppermint Tailoring?

RQ2: How does the current facility layout affect the utilization of workstations, particularly those recorded with 0% usage such as the Box and Curing Stations?

RQ3: To what extent does the allocation of tasks among production stations influence workload imbalance and resource underutilization?

RQ4: How does excessive movement and blocking of raw materials (82.10% move logic time; 21+ minutes blocked) affect the overall efficiency and flow of the production line?

Q5: What is the impact of current ergonomic conditions and lack of safety protocols on worker productivity and job satisfaction?

RQ6: How responsive is management to operational concerns raised by workers, and how does this affect day-to-day production activities?

RQ7: In what ways do inadequate ventilation and environmental conditions affect the physical and mental well-being of employees?

RQ8: What are the potential health risks associated with the absence of safety measures for workers in high-heat and pressure-intensive areas of production?

Literature Review

Low-volume manufacturing presents distinct challenges such as inconsistent workloads, underutilized resources, and inefficient workflows. Afonso et al. (2018) emphasize that traditional high-volume strategies are often unsuitable for small-scale producers, who require flexible and customized process improvement approaches.

Time-and-motion studies remain a foundational tool in identifying inefficiencies by measuring actual task durations and idle times (Heizer, Render, & Munson, 2016). Paired with Fishbone Diagrams, these tools help isolate root causes across manpower,

methods, machinery, materials, and environment (Alghamdi & Abu-Mahfouz, 2020). Simulation modeling, particularly using tools like ProModel, enables manufacturers to evaluate proposed changes without disrupting actual operations (Russell & Taylor, 2017). Beyond technical improvements, ergonomic conditions and workplace design play a crucial role. Poor ventilation, heat, and limited workspace reduce productivity and increase health risks (Zhan et al., 2021). Worker feedback and management responsiveness are also essential in ensuring sustainable change, as participative improvement strategies help align processes with frontline realities (Ridder, 2017).
This study builds on these frameworks by applying industrial engineering methods and simulation to improve the efficiency and safety of Peppermint Tailoring's production system.

Methodology

This research adopted a descriptive quantitative research design integrated with a case study approach to systematically investigate and improve the production process of Peppermint Tailoring, a low-volume T-shirt manufacturing firm. The selected methodology was appropriate for addressing the study's primary objective: identifying the causes of production inefficiencies and evaluating strategic interventions through empirical and data-driven means.

Research Design

Descriptive quantitative research, as defined by Creswell and Creswell (2018), involves the systematic collection of quantifiable information that accurately characterizes current conditions or phenomena. This approach facilitated the structured assessment of the production system, allowing for detailed measurement of operational variables such as task durations, workstation utilization, and production output.
Complementing the quantitative approach, a single-case study method was employed to explore the research problem within its real-world context (Yin, 2018; Ridder, 2017). Given the study's emphasis on understanding the interplay of multiple variables in a live production environment, the case study framework enabled a holistic and contextual analysis of the unique challenges faced by low-volume manufacturers.

Data Collection Procedures

To ensure the validity and reliability of the findings, multiple data collection methods were employed:

Time-and-Motion Study:

The researchers conducted a comprehensive time study across all workstations to measure the standard time, observed time (using the Flyback Timing method), and transportation time for each production task. This data provided the foundation for calculating baseline efficiency, identifying bottlenecks, and evaluating idle or underutilized stations.
Fishbone Diagram (Ishikawa Tool):
A cause-and-effect diagram was constructed to categorize potential root causes of inefficiencies into major categories, including Manpower, Methods, Machines, Materials, and Environment. This qualitative tool provided a visual synthesis of systemic issues affecting production performance (Alghamdi & Abu-Mahfouz, 2020).

Simulation Modeling (ProModel Software):

To test alternative layouts and production strategies, discrete-event simulations were developed using ProModel. Two proposed facility layouts were simulated to evaluate their effectiveness in enhancing efficiency, reducing bottlenecks, and minimizing non-value-adding activities. Simulation outputs included:

- Workstation utilization rates
- Processing and movement times
- Resource capacity levels
- System flow behavior and entity congestion

Data Analysis

The collected data were subjected to both descriptive and simulation-based analyses:

Descriptive Analysis:

Standard statistical techniques (means, percentages, utilization rates) were used to quantify operational performance. Production efficiency was computed using the formula:

$$\text{Production Efficiency (\%)} = \left(\frac{\text{Actual Output Rate}}{\text{Standard Output Rate}}\right) \times 100$$

The baseline efficiency was calculated at 73.08%, with significant time lost in material movement and blocking.

Comparative Simulation Analysis:

Simulation results were compared across the current layout and two proposed alternatives. The first layout yielded an efficiency improvement to 89.23%, while the second reached 84.62%. Data were analyzed based on:

- Average task completion times
- Percentage of time spent in move logic, operation, waiting, and blocking
- Entity flow patterns and system throughput
- Storage congestion and workstation idle times

By combining quantitative data collection, qualitative insight, and predictive simulation, the methodology provided a comprehensive framework for analyzing and improving the operations of Peppermint Tailoring. The approach is particularly applicable to other low-volume manufacturing firms facing similar challenges in process efficiency and resource utilization.

Results and Discussion

The researcher proposed their solution into three alternatives based on its data analysis. The proposed action will serve as a recommendation for the improvement of the process of the firm, considering those factors and the possible risk of accepting those alternatives. In addition, those risks are identifiable and will provide an efficient solution to lessen the effect of chance.

For its alternative, the researcher intends to focus on existing data by providing comprehensive-time study data and its existing pro model data.

For the Time study, the researcher provides the standard time and its observed time (Flyback Timing) for its comprehensive analysis, which will be used for the interpretation of pro-model, which will be used for creating alternatives for the company.

Table 1.
Standard Time of manufacturing Dress

Process Station	Operation Time (mins.)	Transportation (mins.)
Box	0	0.0833
Curing Station	3	1
Cutting Station	5	0.78
Packing	0.5	0.55
Bin	0	0.15
Printer	5	0.583
Finish End	1	0
Total	15.6463	

The time study for manufacturing a dress reveals a total standard time of 15.6463 minutes, comprising 15.5 minutes of operation time and 3.1463 minutes of transportation time. Key inefficiencies include significant transportation times at the curing (1 minute) and cutting (0.78 minutes) stations, while bottlenecks are observed at the cutting and printer stations, each requiring 5 minutes of operation. Idle stations like the box and bin contribute transportation time without direct operations, suggesting opportunities for streamlining. To enhance efficiency, recommendations include optimizing material handling, reducing transportation times, addressing bottlenecks through automation or task parallelization, and reassessing the necessity of idle stations. Simulation modeling using Pro-Model is proposed to evaluate alternative lay- outs and workflows for improving the manufacturing process.

Table 2.
Observe Time (Flyback Timing)

Process Station	OT1	OT2	OT3	Average OT
Box	0.122	0.182	0.257	0.187
Curing Station	4.325	4.969	4.581	4.625
Cutting Station	6.583	7.865	8.301	7.583
Packing	0.7941	0.9256	0.8873	0.869
Bin	0.0272	0.0224	0.0263	0.0253

After the TMS (Time and Motion Study), the Researcher computes the Production Efficiency by determining the actual output rate of the product and the standard output rate used in the company. The expected output rate helps the research- er determine the efficiency of the existing production layout. With the help of the work-study method, a worker's job process is decided. Based on computation, the existing production efficiency is about 73.08%.

Production efficiency = (actual output rate / standard out- put rate) x 100% Actual output rate = 475 T-Shirts/8 hours =59.375 T-shirts/hour Standard output rate = 650 T-Shirts/8 hours = 81.25 T-shirts/hour Efficiency % = (59.375/81.25) x 100% = 73.08%.

The researcher proposed a new and improved facility layout to increase their output and eliminate delays in the manufacturing facility. The management should implement the new process to increase efficiency and the number of outputs produced daily. Moreover, there are areas of concern regarding materials, tools, and supplies in T-shirt production.

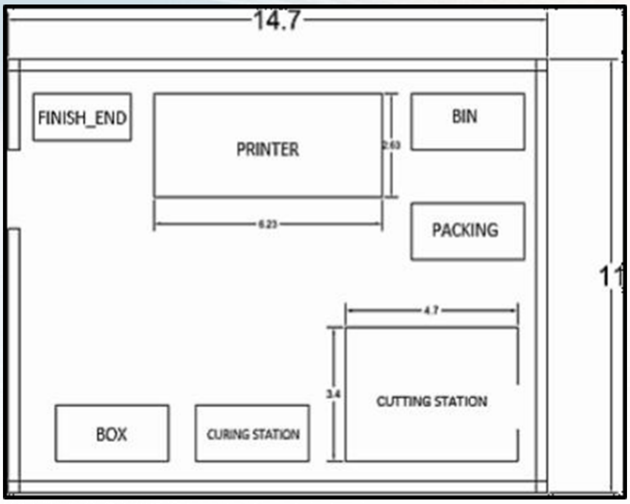

Figure 1.0 Existing Production Layout of the T-Shirt Manufacturing Process

The first proposed simulation revealed notable inefficiencies in resource utilization across the production process. Key stations such as the Box and Curing Station remained idle with 0% utilization, indicating poor integration into the workflow. While the Cutting, Printer, and Finish End stations processed a high number of entries, their utilization rates remained low, ranging from 2.13% to 9.11%, suggesting imbalances in workload distribution. The Packing Station demonstrated the highest utilization at 13.41%, highlighting its more active role in the system. Overall, the simulation emphasized the need for better synchronization and workload realignment among stations to improve production flow and operational efficiency (Stevenson, 2020; Heizer et al., 2016; Russell & Taylor, 2017).

Table 4.
Pro model simulation result data.

Name	Scheduled Time (HR)	% Empty	% Part Occupied	% Full	% Down
Box	8.00	100.00	0.00	0.00	0.00
Curing Station	8.00	100.00	0.00	0.00	0.00
Cutting Station	8.00	72.04	27.96	0.00	0.00
Bin	8.00	16.95	83.05	0.00	0.00
Printer	8.00	18.90	81.10	0.00	0.00
Packing	8.00	47.96	52.04	0.00	0.00
Finish End	8.00	19.40	80.60	0.00	0.00

The analysis of Table 4 revealed that several workstations in the simulated production system were either underutilized or overutilized. Both the Box and Curing Stations remained entirely idle during the entire 8-hour schedule, with 100% empty time, indicating inefficiencies or unnecessary inclusion in the process (Heizer, Render, &

Munson, 2016; Russell & Taylor, 2017). The Cutting Station had low utilization, being part-occupied only 27.96% of the time, suggesting it was not a significant contributor to the production bottleneck. On the other hand, the Bin, Printer, and Finish.End stations operated at high efficiency, with part-occupied times of 83.05%, 81.10%, and 80.60% respectively, showing they handled a substantial portion of the workload. The Packing Station also showed moderate activity, being part-occupied 52.04% of the time. These results suggested that the production line had imbalances in resource deployment, where some stations were overburdened while others remained idle, highlighting the need for better process flow and workload distribution.

Table 5.
Running time.

Name	% In Move Logic	%Waiting	% In Operation	% Blocked
Raw Material	82.10	0.55	5.02	12.33

The analysis of Table 5 demonstrated that raw materials in the simulation spent a significant portion of time, 82.10%, in move logic, indicating extensive transportation or movement activities within the system (Heizer, Render, & Munson, 2016; Russell & Taylor, 2017). Only 5.02% of the time was allocated to actual operation or processing, while 12.33% of the time the materials were blocked, implying that production delays occurred due to downstream constraints or unavailable resources. Waiting time was minimal at 0.55%, suggesting that raw materials rarely experienced idle time due to scheduling or resource allocation issues. These results suggested inefficiencies in layout or material handling systems and emphasized the need to streamline internal logistics to improve production flow and reduce time wasted in non-value-adding movements.

Table 6.
Entity activity data.

Name	Total Exits	Current Qty in System	Avg Time in System (MIN)	Avg Time in Move Logic (MIN)	Avg Time Waiting (MIN)	Avg Time in Operation (MIN)	Avg Time Blocked (Min)
Raw Material	580.00	170.00	205.51	173.49	1.29	9.50	21.23

The analysis of Table 6 showed that a total of 580 raw material entities exited the system, while 170 units remained within the process flow. Each raw material spent an average of 205.51 minutes in the system, with the majority of that time, approximately 173.49 minutes, dedicated to move logic, indicating extensive transportation or transfer durations (Heizer, Render, & Munson, 2016; Russell & Taylor, 2017). The average waiting time was minimal at 1.29 minutes, and the actual processing time (operation) accounted for 9.50 minutes. Notably, materials experienced an average of 21.23 minutes being blocked, which indicated process interruptions due to downstream unavailability or system constraints. These findings revealed a system where material handling consumed a disproportionate amount of time compared to processing, signaling the need for layout optimization and improved flow management to enhance overall operational efficiency.

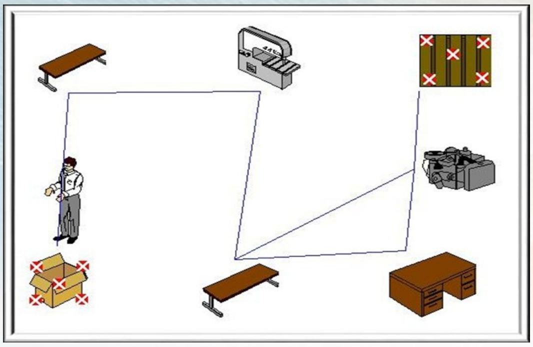

Fig. (2). *1st Alternative proposed layout. (A higher resolution / colour version of this figure is available in the electronic copy of the article).*

The first alternative proposed simulation in figure 2 demonstrated a slightly lower increase in output compared to the initial simulation; however, it still resulted in a more optimized production plan than the current operational system. The data presented in the simulation table showed the machine running time utilized during the second proposed production program, highlighting improved allocation of resources. In addition, the data reflected the percentage of product completion under this alternative, as well as the number of finished products exiting the existing production area.In terms of production efficiency, the output was calculated using the standard formula: production efficiency = (actual output rate / standard output rate) × 100% (Heizer et al., 2016). The second proposed simulation achieved an actual output rate of 550 T-shirts over an 8-hour period, equivalent to 68.75 T-shirts per hour. When compared to the standard output rate of 650 T-shirts within the same time frame (81.25 T-shirts per hour), the resulting efficiency was 84.62%. This indicated a significant improvement over the current setup, albeit slightly below the optimal benchmark, and suggested a potential for further enhancements in resource utilization and process flow (Russell & Taylor, 2017).

Table 7.
Pro Model data.

Name	Scheduled Time (HR)	Capacity	Total Entries	Avg Time per Entry (MIN)	Avg Contents	Maximum Contents	Current Contents	%Utilization
Box	8.00	999999.00	150.00	0.00	0.00	1.00	0.00	0.00
Curing Station	8.00	150.00	150.00	0.00	0.00	1.00	0.00	0.00
Cutting Station	8.00	150.00	150.00	52.07	16.27	86.00	0.00	10.85
Bin	8.00	150.00	150.00	125.12	39.10	91.00	2.00	26.07
Printer	8.00	150.00	593.00	50.93	62.92	150.00	83.00	41.94
Packing	8.00	150.00	660.00	2.99	4.11	16.00	6.00	2.74
Finish End	8.00	150.00	653.00	2.10	2.86	10.00	3.00	1.90

The Pro Model simulation data in Table 7 revealed significant variations in activity and utilization across the system components. The Box and Curing Station recorded zero utilization despite their scheduled time of 8 hours and a high-capacity setting, suggesting these resources were either unnecessary or improperly integrated in the model. In contrast, the Cutting Station showed moderate usage with 10.85% utilization, handling 150 entries with an average of 52.07 minutes per entry and a peak content of 86 entities. The Bin exhibited higher utilization at 26.07%, with an average of 125.12 minutes per entry, reflecting storage congestion. The Printer had the highest activity, with 593 entries and 41.94% utilization, suggesting a major processing hub, although it may be nearing a capacity bottleneck with 83 current contents out of 150 maximum. Conversely, Packing and Finish End stations had lower utilization (2.74% and 1.90%, respectively), processing entries quickly, as shown by their short average time per entry (2.99 and 2.10 minutes). These patterns indicated potential inefficiencies, especially upstream in storage and printing, highlighting opportunities for balancing workload and redistributing system capacity (Heizer, Render, & Munson, 2016; Russell & Taylor, 2017).

Table 8.
Running time of simulation

Name	Scheduled Time (HR)	% Empty	% Part Occupied	% Full	% Down
Box	8.00	100.00	0.00	0.00	0.00
Curing Station	8.00	100.00	0.00	0.00	0.00
Cutting Station	8.00	64.34	35.66	0.00	0.00
Packing	8.00	13.89	86.11	0.00	0.00
Bin	8.00	18.07	80.87	1.06	0.00
Printer	8.00	34.38	65.62	0.00	0.00
Finish End	8.00	31.80	68.20	0.00	0.00

Table 8 illustrated the resource utilization and occupancy levels during the 8-hour simulation period. The Box and Curing Station remained completely empty (100% empty time), indicating they were idle and not integrated into the actual production flow. In contrast, the Cutting Station was utilized more, with 35.66% of the time being partially occupied, while the remaining time (64.34%) it was idle. The Packing station showed high utilization, being 86.11% partially occupied, indicating it played a critical role in the process flow. The Bin was notably active, spending 80.87% of the time partially occupied and even 1.06% fully occupied, suggesting a temporary storage congestion issue. Both the Printer and Finish End stations showed moderate to high utilization, with 65.62% and 68.20% partial occupancy, respectively, pointing to their importance in the workflow. These findings suggested that while some resources were underutilized or unnecessary, others faced higher operational demand, indicating a need for load balancing and process optimization (Heizer, Render, & Munson, 2016; Stevenson, 2018).

Table 9.
Entity activity

Name	Total Exits	Current Qty in System	Avg Time in System (MIN)	Avg Time in Move Logic (MIN)	Avg Time Waiting (MIN)	Avg Time in Operatio n (MIN)	Avg Time Block ed (Min)
Raw Material	550.00	166.00	220.31	167.76	1.03	9.50	42.02

Table 9 presented the entity activity data for raw materials during the simulation. A total of 550 raw materials exited the system, while 166 remained in the system by the end of the simulation. The average time each entity spent in the system was 220.31 minutes, with most of this time (167.76 minutes) spent in move logic, indicating considerable

transportation or transfer durations within the system. The average waiting time remained minimal at 1.03 minutes, and the average time spent in operation was 9.50 minutes, suggesting that actual processing time was relatively short. However, the average blocked time was notably high at
42.02 minutes, implying that raw materials frequently experienced delays due to downstream capacity issues or lack of available space. These results indicated inefficiencies in the system's flow and potential bottlenecks that could be mitigated through process redesign or resource balancing (Heizer, Render, & Munson, 2016; Stevenson, 2018).

Discussion

This section presents a comprehensive analysis of the key findings of the study in relation to the research objectives and existing literature. The results highlight several critical inefficiencies and systemic issues within the production process of Peppermint Tailoring, a low-volume manufacturing firm. The insights derived from time-and-motion studies, simulation modeling, and worker feedback are discussed below.

1. Low Production Efficiency

The baseline production efficiency of Peppermint Tailoring was recorded at 73.08%, derived from a comparison between the actual output rate (59.375T-shirts per hour) and the standard output rate (81.25 T-shirts per hour). This considerable discrepancy underscores the presence of systemic inefficiencies in the current manufacturing setup. According to Heizer, Render, and Munson (2016), a production efficiency below 80% in a controlled manufacturing environment is indicative of operational shortcomings such as inadequate workflow design, underutilization of labor or machines, or excessive idle time. The low efficiency figure in this study validates the need for an immediate redesign of production processes and layout optimization.

2. Inefficient Facility Layout and Idle Stations

Simulation results revealed that the Box Station and Curing Station had 0% utilization across both the baseline and proposed layouts. These stations remained idle for the entire 8-hour production simulation, suggesting their redundancy or improper integration into the production workflow. This observation aligns with the findings of Russell and Taylor (2017), who emphasized that inefficient facility layouts often lead to unnecessary workstation inclusion, thereby increasing the complexity of movement and reducing overall throughput. The presence of idle stations also contributes to wasted space and extended transportation paths, both of which are critical issues in lean manufacturing systems.

3. Imbalanced Resource Utilization

The study found significant disparities in the utilization of production stations. The Printer Station exhibited the highest activity, with a utilization rate of 41.94%, processing 593 entries. In contrast, the Packing and Finish End Stations showed significantly lower utilization rates of 2.74% and 1.90%, respectively. These figures indicate a mismatch in task allocation and workflow balancing, resulting in uneven workload distribution. According to Heizer et al. (2016), such imbalances can lead to bottlenecks at highly utilized stations and underperformance at others, reducing the system's overall effectiveness. Therefore, realignment of task responsibilities and production scheduling is essential to achieve a more synchronized workflow.

4. Excessive Material Handling and Production Blockages

The analysis of simulation data showed that raw materials spent 82.10% of their time in movement logic, with an additional 12.33% being blocked due to downstream constraints, while only 5.02% of time was devoted to actual operations. On average, materials were blocked for 21.23 minutes and moved for 173.49 minutes, out of an average total system time of 205.51 minutes. These figures demonstrate an overwhelming presence of non-value-adding activities in the form of excessive movement and waiting. As Stevenson (2018) notes, excessive transport and handling are classic forms of waste in lean systems, contributing directly to lower efficiency and higher production lead times. Optimizing material flow through improved layout and station placement is therefore critical.

5. Suboptimal Working Conditions

Field observations and employee interviews identified several environmental and ergonomic concerns within the production area. Poor ventilation, cramped workspaces, and inadequate lighting were repeatedly mentioned as factors contributing to worker fatigue, physical discomfort, and decreased productivity. Narayanamurthy and Gurumurthy (2016) highlight that ergonomically deficient work environments not only increase the risk of occupational injury but also lead to decreased motivation and morale among workers. These conditions, if unaddressed, can lead to long-term health issues and high employee turnover, both of which are detrimental to organizational performance.

6. Lack of Responsive Management Structures

The study also revealed the absence of a formalized mechanism for capturing and acting upon worker feedback. Despite clear indicators of tool misplacement, ergonomic inefficiencies, and environmental discomfort, no procedures were in place to incorporate employee insights into operational decision-making. This gap reflects a lack of participative management and continuous improvement culture, which are essential components of lean and agile production systems. As observed by Stevenson (2018), failure to integrate bottom-up feedback can result in persistent operational inefficiencies and missed opportunities for innovation.

7. Neglect of Worker Well-Being

Closely linked to the working conditions is the broader issue of employee well-being, both physical and psychological. Workers reported feeling overheated, crowded, and mentally fatigued, particularly in areas lacking adequate airflow or personal space. This aligns with the findings of Afonso, Monteiro, and Paisana (2018), who emphasized that ergonomic and environmental stressors contribute significantly to low job satisfaction and suboptimal performance. Promoting a safe, comfortable, and supportive work environment is therefore not merely a compliance issue but a strategic imperative for enhancing productivity and employee retention.

8. Absence of Occupational Safety Measures

Despite the presence of high-temperature machinery and pressurized equipment, the study found that workers were not provided with basic personal protective equipment (PPE) such as gloves and heat-resistant clothing. This exposes employees to serious health and safety risks, potentially resulting in injury, absenteeism, and legal liabilities for the company. Zhan et al. (2021) emphasized that safety measures are non-negotiable elements of industrial operations, especially in environments involving thermal or mechanical hazards. The current lack of safety protocols reflects a critical oversight in management practices and requires immediate remediation.

Conclusion

This study took a deep look at the production challenges faced by Peppermint Tailoring, a small-scale T-shirt manufacturer operating in a low-volume environment. The results confirmed what was initially suspected: the current system had serious inefficiencies, with a baseline production efficiency of just 73.08%. Through a combination of industrial engineering tools and simulation modeling, the research team was able to design two alternative facility layouts—raising efficiency to 84.62% and 89.23%, respectively. These improvements show that even small changes, when backed by data, can lead to big gains in productivity.
One of the major issues uncovered was the presence of idle or underutilized workstations, particularly the Box and Curing Stations. These areas weren't contributing to the production process but were still taking up space and adding complexity. Redesigning the layout helped eliminate these inefficiencies and created a smoother, more direct workflow. It also helped redistribute tasks more evenly, especially between busy stations like the Printer and less active ones like Packing and Finish End.

Another significant finding was the amount of time raw materials spent in unnecessary movement—over 80% of the time in some cases. Reducing this kind of non-value-adding activity through better layout and more efficient handling dramatically improved overall flow and reduced delays. But the problems weren't just technical. The study also revealed human-centered issues like poor ventilation, cramped workspaces, and a general lack of attention to employee comfort and safety. These conditions were affecting both morale and performance. Simple interventions—such as improving airflow, organizing work areas, and scheduling regular breaks—could make a big difference in how employees feel and work throughout the day.

Management's lack of responsiveness to employee concerns was another barrier. Without proper channels for feedback, recurring issues were going unaddressed. Introducing formal feedback mechanisms and involving workers in improvement discussions could help create a more adaptive and efficient workplace culture.

Perhaps most concerning was the absence of proper safety measures. Workers were handling hot and potentially dangerous equipment without basic protective gear like gloves or heat-resistant clothing. This isn't just a productivity issue—it's a serious risk to health and safety. The company must prioritize regular safety checks and provide appropriate protective equipment to ensure worker wellbeing.

In summary, the study demonstrated that process efficiency in small, low-volume manufacturing settings can be significantly improved through practical, data-informed strategies. Addressing both the technical and human aspects of production led to real improvements—and these findings can serve as a model for similar businesses.

For future researchers, there's room to build on this work. Expanding the analysis to include cost savings, energy use, or long-term performance would provide a fuller picture of the impact of these changes. It would also be useful to explore how digital tools like real-time tracking systems or smart sensors could support continuous improvement. Comparing results across different companies or industries could help refine best practices that others can apply in their own unique contexts. Most importantly, future studies should continue to focus not just on the process, but on the people—because sustainable improvement depends on both.

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Feedback on the Outcome-Based Education of the Circuits I Course of Electronics Engineering at Quezon City University

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Abstract.

This study aimed to assess course and program outcomes needing adjustment to meet Outcome-Based Education (OBE) standards. Data were analyzed using Google's statistical calculator for weighted means and validated through SPSS. Findings indicate that the OBE implementation in Circuits I, Electronics Engineering (ECE) at Quezon City University, received generally favorable student feedback, with areas for improvement. Students expressed positive to moderate perceptions of mentors' execution of OBE principles, particularly their subject matter expertise and ability to connect theory with real-world applications. Learning objectives were clearly presented, lessons were well-structured, and relevant examples and assessments supported learning. Mentors promoted active learning through questioning techniques, feedback, and discussions, though some students desired clearer articulation of complex topics and improved instructional language. Concerns emerged about inconsistent performance evaluation criteria—especially regarding attitudes and behavior—and limited grading transparency in components like recitation, board work, and seatwork. Recommendations include refining program outcomes to align with Republic Act 9292, CHED Memorandum Order No. 101 (s. 2017), and international engineering education standards. Outcomes should be measurable, realistic, and supported by clear indicators. Faculty development should focus on modern teaching methods, communication, and OBE- based assessments. A standardized grading system with explicit percentage allocations should be adopted and discussed with students at the semester's start.

Keywords: Outcome-based education; Circuits I; Electronics Engineering; Program outcome

INTRODUCTION

The start of Academic Year 2025 heralds a period of both challenge and opportunity for the College of Engineering at Quezon City University (QCU), as it strives to respond to the evolving demands of the engineering profession. In an increasingly competitive labor market—whether local, national, or international—graduates are expected to possess not only technical knowledge but also adaptable skills, innovative mindsets, and the capacity to perform in complex, interdisciplinary environments. This reality has placed significant pressure on higher education institutions to shift from traditional content-based instruction to models that ensure students can demonstrate mastery of intended learning outcomes. In response to this imperative, QCU has adopted the Outcome-Based Education (OBE) framework as a central strategy in curriculum delivery and assessment.

Outcome-Based Education is a student-centered approach that focuses on achieving specific and measurable learning outcomes. According to Rathy et al. (2020), OBE is designed to enhance students' acquisition of knowledge, skills, and values through clearly articulated outcomes aligned with program objectives. This pedagogical model encourages learners to engage actively in their own learning process, develop independent problem-solving abilities, and apply theoretical knowledge to real-world tasks. It shifts the emphasis from what teachers teach to what students are able to perform or produce. In the context of engineering education, where technical proficiency and workplace readiness are paramount, OBE provides a robust mechanism for aligning academic instruction with professional standards and industry needs.

At QCU, the implementation of OBE began in earnest during the academic disruptions caused by the COVID-19 pandemic. The shift to this model not only served as an adaptive response to the limitations of face-to-face learning but also as a long-term institutional commitment to modernizing teaching and learning processes. In the College of Engineering, particularly in the Electronics Engineering program, OBE continues to be employed to structure course content, develop instructional materials, and assess student performance in both theoretical and laboratory-based subjects. The university's engineering graduates are therefore expected to demonstrate not only academic competence but also practical skills and behavioral outcomes consistent with 21st-century workforce expectations.
However, while OBE has been integrated into academic programming, there remains limited empirical data on its effectiveness in the context of QCU's Electronics Engineering curriculum. Initial internal reviews and related studies conducted in 2023 suggested that while the curriculum aligned well with CHED Memorandum Order No. 101, Series of 2017, there were gaps in implementation—specifically in the quality of instructional materials, the clarity of learning objectives, and the sufficiency of laboratory equipment to support outcome-based tasks. These findings underscore the need for a comprehensive evaluation of both the OBE syllabi and the instructional resources being used in key engineering subjects such as Circuits I.

This study, therefore, seeks to evaluate the feedback of students enrolled in the Electronics Engineering program on the implementation of OBE in Circuits I. It focuses on the students' perceptions of the course content, the instructional competence of faculty, and the adequacy of materials used in both lecture and laboratory settings. Guided by the Input-Process-Output (IPO) conceptual framework, the research aims to identify both strengths and challenges in the OBE approach as implemented, and to provide evidence-based recommendations for continuous curriculum improvement. The results of this study are intended to contribute to the enhancement of QCU's engineering programs and ensure alignment with both institutional quality assurance standards and the broader outcomes of Philippine higher education.

METHODOLOGY

This study was conducted to evaluate the effectiveness of the Outcome-Based Education (OBE) curriculum as implemented in the Circuits I course under the Electronics Engineering (ECE) program of Quezon City University (QCU). Given QCU's vision of becoming the leading local university in terms of employable graduates, it is essential to ensure that its academic programs produce graduates who are competent, knowledgeable, and industry-ready. To assess this, the study employed a systematic methodology encompassing research design, ethical safeguards, sampling framework, data collection instruments, and analytic procedures, all designed to uphold academic rigor and institutional integrity.

This research employed a descriptive-qualitative design to explore and analyze student feedback on the OBE-based course content and instructional materials of Circuits I. In addition to survey responses, the study incorporated a documentary analysis of the OBE syllabus, using CHED Memorandum Order (CMO) No. 101, Series of 2017 as the primary regulatory reference for alignment and compliance.

Respondents of the Study

The primary respondents were Electronics Engineering students enrolled in the Circuits I course during Academic Year 2024-2025. To ensure relevance and accuracy of feedback, pre-qualification procedures were implemented to verify the respondents' enrollment status and familiarity with the OBE framework.

Respondents were selected based on their experience with the course and their access to the relevant instructional materials. A total of 50 students participated in the study. This sample size was determined to be sufficient for institutional evaluation purposes, with an estimated 98% confidence level and ¬±2% margin of error.

Population and Sampling Technique

The study utilized purposive sampling, a non-probability method that selects participants based on specific characteristics relevant to the research objectives. Only students who had taken or were currently taking the Circuits Icourse and had been taught under the OBE-aligned syllabus were considered eligible. Validation of eligibility was done through official registration cards and access to the course syllabus.

Research Instrument

The main data collection tool was a researcher-made survey questionnaire, which underwent expert validation and pilot testing. The instrument consisted of two parts:

1. Part I assessed student feedback on the OBE-aligned course syllabus, focusing on the following domains:
   a. Mastery of subject matter by the faculty
   b. Communication and instructional delivery
   c. Clarity and attainability of learning objectives
   d. Acquisition of knowledge, skills, and positive attitudes
   e. Adequacy and relevance of instructional materials

2. Part II identified the challenges students encountered during the implementation of OBE in Circuits I, including laboratory applications, clarity of instructions, and instructional support.

The final questionnaire was reviewed by subject-matter experts in engineering education and revised based on feedback from a pilot test involving 10 students (not part of the final sample). The instrument was then calibrated for clarity and internal consistency.

Data Gathering Procedure
After finalizing the research instrument and securing ethical clearance, the researchers coordinated with faculty members and administrative staff to facilitate the distribution of the survey. The questionnaire was deployed via a secure electronic platform, ensuring accessibility and confidentiality.
Students were given a 15-day window to accomplish the questionnaire. Reminders were sent periodically to improve response rates. Faculty members who previously handled the course were enlisted to assist in promoting the survey without exerting undue influence on students.

Ethical Considerations
Prior to data collection, the study secured necessary approvals from the Quezon City University Research Ethics Review Committee (RERC) to ensure adherence to research ethics and data privacy standards. A formal request for permission to conduct the study was submitted to the Dean of the College of Engineering and the Area Chairperson for Electronics Engineering.

All respondents were provided with an Informed Consent Form outlining the purpose, scope, voluntary nature, and confidentiality of the study. Participation was strictly voluntary, and students were assured that their responses would not affect their grades or standing. All data were collected and handled in accordance with the Philippine Data Privacy Act of 2012, ensuring anonymity, secure data storage, and limited access only to the researchers.

RESULTS AND DISCUSSION
Based on the methods and procedure discussed in the previous section, the circuits 1's data is hereby presented, analyzed, and interpreted with a relevant conclusion and recommendation for this study.

Table 1
Feedback on the mastery of the subject matter of the mentor

OBE LEARNING ATTAINABILITY EXTENT	WEIGHTED MEAN (WM)	VERBAL INTERPRETATION
The mentor shows high proficiency in circuits I…	2.61	Agree
Discusses the topic clearly…	1.72	Moderately Agree
Discusses the learning objectives and its attainability…	1.68	Moderately Agree
Gives several examples within the level of understanding of students…	2.71	Agree
Relates the example in the modern world work application of lesson…	2.63	Agree
Asks students the part of lesson with difficulty…	2.79	Agree
Ensures that the learning objectives of a particular lesson of the day is fully attained…	2.88	Agree
Total	Total WM: 2.43	Moderately Agree

n=50, ± 2% margin Error

Table 1 above reflects the feedback of respondents on the mastery of subject matter of the mentor in Circuits 1. There were 50 respondents and set at a ± 2% margin of error. Five items fell in the category of "AGREE," which are items 1, 4, 5, 6, and 7 that correspond to the weighted means of (WM)= 2.61, (WM)= 2.71, (WM)= 2.63, (WM)= 2.79, and (WM)= 2.88, respectively. This implied that the mentor showed high proficiency in circuits 1, gave several examples within the level of understanding of students, was able to relate the example to the modern world work application of the lesson, was able to ask students about the part of the lesson with difficulty, and was able to ensure that the learning objectives of a particular lesson of the day were fully attained, respectively. In addition, there were two (2) items that fell in the category of “MODERATELY AGREE”; these items are 2 and 3, which correspond to (WM)=1.72 and (WM)=1.68. This further implied that the mentor has been able to discuss the topic clearly and has been able to moderately learning objectives and their attainability. Moreover, the total Weighted Mean (WM) of 2.43 in the research context can be interpreted to mean that the respondents had moderately agreed in terms of the mastery of the subject matter of the mentor. In addition, the result of this survey indicated that the outcome-based education (OBE) program of Circuits I should be the concern of the mentor to be addressed in order to meet the objectives of the course outcome and the program outcome in Circuits 1 syllabus.

Recognizing that this study is aimed at improving the OBE program of Circuit 1 of Electronics Engineering in QCU, there are similar studies that have been integrated to the present study as a matter of validation for the indicators in the findings above. The concept of an outcome-based education (OBE) is to focus on the learning outcomes of what the students can do after the lesson and not on the knowledge that students may understand from concepts, principles, and theories. This statement is validated in a study conducted by Nirmala (2020) entitled “A STUDY ON OUTCOME-BASED EDUCATION--ISSUES AND CHALLENGES,” which put the emphasis on the product-what sort of graduates will be produced-rather than on the educational process in a specific study. Nirmala (2020) study is similar to the present study as both papers involved an outcome-based learning strategy from which the current study has the objectives of (1) To determine the feedback of the respondents to the curriculum content of the ECE OBE syllabi structure; (2) To determine the feedback of the respondents to the level of adequacy in the delivery of learning resources of instructional materials; and (3) To determine the problems encountered with respect to the teaching strategy whether OBE or not OBE & problems encountered with respect to the instructional materials used in the OBE syllabi. The present study founded its conceptual framework on the Commission on Higher Education (CHED) Memorandum Order Nr. 101 Series of 2017. The researchers employed the IPO model in the conceptualization of research and took the initiatives from the INPUTS which are circuits 1 syllabus, CHED Memorandum Order 101 Series of 2017, Metrics for Feedback of the learners to the OBE program, Metrics for the Feedback of the ECE learners to the instructional materials of ECE faculty, Measurable standard for knowledge, skills, and behavior acceptable to QCU Academic Affairs, Metrics for students’ knowledge, skills, positive attitude, and behavior, and Review of related studies and Literature, respectively.

Table 2
Feedback on communication skills of the mentor

OBE LEARNING ATTAINABILITY EXTENT	WEIGHTED MEAN (WM)	VERBAL INTERPRETATION
The mentor shows high proficiency in clear and concise language…	1.89	Moderately Agree
Shows high ability in active listening…	2.84	Agree
Shows effective use of body language to catch students' attention…	2.33	Moderately Agree
Motivates students to engage in class discussion of lesson…	2.76	Agree
Shows confidence when he talks to class…	2.91	Agree
Observe and use correct grammar…	2.78	Agree
Asks relevant questions to students…	2.89	Agree
Total	Total WM= 2.63	Agree

n=50, ± 2% margin Error

Table 2 above reflects the feedback of respondents on the communication skills of the mentor in Circuits 1. There were 50 respondents and set at a ± 2% margin of error. Five items fell in the category of "AGREE," which are items 9, 11, 12, 13, and 14 that correspond to the weighted means of (WM)= 2.84, (WM)= 2.76, (WM)= 2.91, (WM)= 2.78, and (WM)= 2.89, respectively. This implied that the mentor showed high ability in active listening, was able to motivate students to engage in class discussion of lesson, was able to show confidence when he talks to class, was able to observe and use correct grammar, and was able to ask relevant questions to students, respectively. In addition, there were two (2) items that fell in the category of "MODERATELY AGREE"; these items are 1 and 3, which correspond to (WM)= 1.89 and (WM)= 2.33. Which further implied that the mentor has been able to moderately shows high proficiency in clear and concise language and has been able to moderately show effective use of body language to catch students' attention. Moreover, the total Weighted Mean (WM) of 2.63 in the research context can be interpreted to mean that the respondents had agreed in terms of the communication skills of the mentor.

Based on the findings above, the mentor in Circuits 1 still has room for improvement in terms of effective communication skills to fully attain the learning objectives in the syllabus of the OBE program. In addition, it cannot be overemphasized that it is a matter of what the students can do and not what the students can learn from theories, concepts, and principles taught from the syllabus. In a study conducted by Guangya & Fan (2019) entitled "Research on the Effectiveness of Outcome-Based Education in the Workplace Communication Curriculum of Undergraduates," findings revealed that more than 90% of undergraduates will devote themselves to work. For them, "workplace communication" is an important course. This study proposes that OBE means having active effects on the communication skills of undergraduates. Basing on the OBE model, the teacher stimulated the corpus consciousness of students by optimizing the teaching structure, improving teaching methods and creating a good teaching environment. At the same time, teacher timely inspired and encouraged students, so that students maintain the enthusiasm and initiative in learning, build up learning confidence, improve communication skills. It is therefore imperative that, mentors should be a role model of good and effective communication skills to emulate by the students to enhance teaching and learning capabilities. While the objectives of the present study was (1) To determine the feedback of the respondents to the course content of circuits in the ECE OBE syllabus structure; (2) To determine the feedback of the respondents to the level of adequacy in the delivery of learning resources of circuits 1 instructional materials; and (3) To determine the challenges and opportunities in the implementation of Outcome-based education in ECE department. Moreover, the present study used descriptive qualitative and descriptive quantitative technique to analyze and interpret the collected data using the data analytics of percentage and frequency distribution respectively. Considering the nature of this study, the respondents of the study were purposively chosen according to year level, course and available syllabi and registration card as a matter of confirmation that they are currently enrolled and participated in the study. Lastly, Nirmala (2020), Hamidi et al. (2024), and Guangya & Fan (2019) are related to the present study, as these research papers are directed to the outcome-based learning that is a student-centered instruction model that stresses judging student performance through outcomes particularly on effective communication skills of the mentor.

Table 3
Feedback on attainability of learning objectives in Circuits 1

OBE LEARNING ATTAINABILITY EXTENT	WEIGHTED MEAN (WM)	VERBAL INTERPRETATION
1. The mentor introduces the topic clearly…	2.61	Agree
2. Defines the learning objectives…	2.75	Agree
3. Discusses the learning content…	2.80	Agree
4. Ensures that the lesson will end as planned	2.95	Agree
5. Specifies the coverage of lesson for the day…	2.83	Agree
6. Ensures that at the end of the lesson students will gain an attainable skill…	2.60	Agree
7. Ensures that at the end of the lesson students will develop positive attitude…	2.73	Agree
Total	Total WM= 2.75	Agree

n= 50, ± 2% margin of error

Table 3 above reflects the feedback of respondents on the attainability of learning objectives in Circuits 1. There were 50 respondents and set at a ± 2% margin of error. Seven items fell in the category of “AGREE,” which are items 15, 16, 17, 18, 19, 20, and 21 that correspond to the weighted means of (WM)= 2.61, (WM)= 2.75, (WM)= 2.80, (WM)= 2.95, (WM)= 2.83, (WM)= 2.60, and (WM)= 2.73, respectively.

This implied that the mentor introduced the topic clearly, was able to define the learning objectives, was able to discuss the learning content, ensured that the lesson will end as planned, was able to specify the coverage of lesson for the day, was able to ensure that at the end of the lesson students will gain an attainable skill, and was able to ensure that at the end of the lesson students will develop positive attitude, respectively. Moreover, the total Weighted Mean (WM) of 2.75 in the research context can be interpreted to mean that the respondents had agreed in terms of the attainability of learning objectives in Circuits 1.

Having a well-trained and well experienced mentor can certainly deliver effective teaching strategy that guarantees the attainability of learning objectives. This theory has been proven in the findings above from survey based on the ECE students feedback on their mentor handling the circuits 1 subject. In a study by conducted Kavitha & Karthika (2023) entitled “Implementation Challenges and Opportunities in the Outcome-Based Education (OBE) for Teaching Engineering Courses: A Case Study,” findings revealed that the attainment of program outcomes (POs) was the main objective of the curriculum design, and the teaching-learning process adapted. The main source of PO attainment was CO attainment. The targets for the CO attainments are fixed based on the performance comparison with the previous batches. This paper analyzed the teaching-learning and assessment process implemented for the course Antenna and Wave Propagation offered for third-year BE (ECE) students. Based on the results and analysis, suggestions were given for a stable feedback system to achieve improvement in students’ performance. The results show that adapting the teaching-learning / assessment process more dynamically during the course based on the CAT and Assignment performance will help the students to achieve the learning outcomes. Based on the analysis, it is suggested to fix the CO targets based on the CO attainments obtained in the previous semesters of the same batch to get meaningful results. Further, it is observed that the microanalysis of the end semester and the student’s feedback alone is sufficient for the overall CO attainment computations. Kavitha & Karthika (2023) study and the present study are related because both papers involved an evaluation of the outcome-based education program for engineering students.

Table 4
Feedback on student knowledge acquisition in Circuits 1

OBE LEARNING ATTAINABILITY EXTENT	WEIGHTED MEAN (WM)	VERBAL INTERPRETATION
1. The mentor allows the students to define basic concepts…	2.87	Agree
2. Allows the students to understand the principles of the present lesson…	2.67	Agree
3. Discusses the concept and theories inter relationships…	2.64	Agree
4. Allows students to raise questions for clarifications…	2.78	Agree
5. Gives a short quiz as evaluation tool for the new knowledge attainability measure…	2.72	Agree
6. Discusses the result of quiz including the corrections from students’ wrong answers…	2.69	Agree
7. Ensures that there is always a reinforcement at the end of the class through a relevant homework…	2.81	Agree
	Total WM= 2.74	Agree

n= 50, ± 2% margin of error

Table 4 above reflects the feedback of respondents on the student knowledge acquisition in Circuits 1. There were 50 respondents and set at a ± 2% margin of error. Seven items fell in the category of “AGREE,” which are items 22, 23, 24, 25, 26, 27, and 28 that correspond to the weighted means of (WM)= 2.87, (WM)= 2.67, (WM)= 2.64, (WM)= 2.78, (WM)= 2.72, (WM)= 2.69, and (WM)= 2.81, respectively.

This implied that the mentor allowed the students to define basic concepts, allowed the students to understand the principles of the present lesson, was able to discuss the concept and theories inter relationships, allowed students to raise questions for clarifications, was able to give a short quiz as evaluation tool for the new knowledge attainability measure, was able to discuss the result of quiz including the corrections from students' wrong answers, and was able to ensure that there is always a reinforcement at the end of the class through a relevant homework, respectively.

Moreover, the total Weighted Mean (WM) of 2.74 in the research context can be interpreted to mean that the respondents had agreed in terms of the student knowledge acquisition in Circuits 1.

The survey result above is a clear indication that knowledge acquisition can be earned through effective teaching strategies of the mentor. Specifically, acquisition of knowledge can be facilitated when the mentor allows the students to define basic concepts and ensures that there is always a reinforcement at the end of the class through relevant homework. In addition, a well-designed syllabus and a teacher with excellent teaching capability to deliver the objectives of the course outcome and the program outcomes are the essentials of OBE. Outcome Based Education aka OBE is one of the de-factor standards for the modern educational system. An outcome is a culminating demonstration of learning that the students should be able to do at the end of a course, and in process at end of the degree program. Therefore, OBE is an approach to education in which decisions about the curriculum are driven by the exit learning outcomes that the students should perform in their professional life. An engineer is a unique combination of different skill sets that must be mastered to resolve nontrivial real-life engineering problems. Consequently, the adoption of OBE in engineering education is the compelling necessity. This study offers a comprehensive, ready to adopt OBE framework for tertiary level engineering programs complying with the benchmark mandates of the OBE and the guidelines of Washington Accord. Additionally, the framework is successfully deployed in the department of CSE, IUB for the design and implementation of the undergraduate CSE program, a transcript of which is also documented. This will assist the concerned institutions to design their program in OBE model to gain international academic equivalency and accreditation. While Syeed et al. (2022) paper resolved the issues relating to OBE and explored the different dimensions of an Outcome-Based learning strategy, the present study will look into the attainment of the research objectives as follows: (1) To determine the feedback of the respondents to the course content of circuits 1 in the ECE OBE syllabus structure; (2) To determine the feedback of the respondents to the level of adequacy in the delivery of learning resources of circuits 1 instructional materials; (3) To determine the challenges and opportunities in the implementation of Outcome-based education in ECE department.

Table 5
Feedback on student's skills acquisition in Circuits 1

OBE LEARNING ATTAINABILITY EXTENT	WEIGHTED MEAN (WM)	VERBAL INTERPRETATION
1. The mentor allows the students to define basic techniques on mathematical operation…	2.61	Agree
2. Introduces the importance of critical thinking…	2.65	Agree
3. Discusses the applicability of measurement in a specific problem and its application…	2.73	Agree
4. Strengthens the problem-solving skills of students…	2.70	Agree
5. Demonstrates how to conduct Data Analysis…	2.84	Agree
6. Evaluates how students work using estimation and how a student can use it in his daily life…	2.68	Agree
7. Evaluates how students use the graphs and formulas…	2.60	Agree
	Total WM= 2.69	Agree

n= 50, ± 2% margin of error

Table 5 above reflects the feedback of respondents on the student skills acquisition in Circuits 1. There were 50 respondents and set at a ± 2% margin of error. Seven items fell in the category of "AGREE," which are items 29, 30, 31, 32, 33, 34, and 35 that correspond to the weighted means of (WM)= 2.61, (WM)= 2.65, (WM)= 2.73, (WM)= 2.70, (WM)= 2.84, (WM)= 2.68, and (WM)= 2.60, respectively. This implied that the mentor was able to allow the students to define basic techniques on mathematical operation, was able to Introduce the importance of critical thinking, was able to discuss the applicability of measurement in a specific problem and its application, strengthened the problem-solving skills of students, demonstrated how to conduct Data Analysis, evaluated how students work using estimation and how a student can use it in his daily life, and was able to evaluate how students uses the graphs and formulas, respectively. Moreover, the total Weighted Mean (WM) of 2.69 in the research context can be interpreted to mean that the respondents had agreed in terms of the student's skills acquisition in Circuits 1.

Results of the survey above indicated that skill acquisition can be earned in many ways when mentors allowed the students to define basic techniques on mathematical operations, introduced the importance of critical thinking, and evaluated how students used the graphs and formulas effectively. In addition, skill acquisition is a mode of learning that develops new abilities, whether physical or cognitive, by way of practical application and experience. According to Berk (2005), there are twelve (12) strategies to measure teaching effectiveness; these are (1) student ratings, (2) peer ratings, (3) self-evaluation, (4) videos, (5) student interviews, (6) alumni ratings, (7) area chairpersons ratings, (8) administrator ratings, (9) teaching scholarship, (10) teaching awards, (11) learning outcome measures, and (12) teaching portfolios, respectively. These twelve (12) strategies of measuring teaching effectiveness can certainly improve not only the curriculum and syllabi of Electronics Engineering, but even the students skills acquisition integrated in the OBE program outcomes and course outcomes can certainly be enhanced when the current syllabus of OBE circuits 1 is calibrated accordingly.

Table 6
Feedback on positive attitude acquisition in Circuits 1

OBE LEARNING ATTAINABILITY EXTENT	WEIGHTED MEAN (WM)	VERBAL INTERPRETATION
1. The mentor encourages students to prioritize goal setting…	2.62	Agree
2. Encourages mindfulness…	2.66	Agree
3. Encourages to always express gratitude to fellow students and teachers…	2.75	Agree
4. Emphasize to students the growth mindset as they mature…	2.80	Agree
5. Emphasize to celebrate successwith fellow students, teachers, friends, and family…	2.70	Agree
6. Inculcate students to avoid negative remarks…	2.68	Agree
7. Reinforce the value of interactive learning…	2.77	Agree
	Total WM= 2.85	Agree

n= 50, ± 2% margin of error

Table 6 above reflects the feedback of respondents on the positive attitude acquisition in Circuits 1. There were 50 respondents and set at a ± 2% margin of error. Seven items fell in the category of “AGREE,” which are items 36, 37, 38, 39, 40, 41, and 42 that correspond to the weighted means of (WM)= 2.62, (WM)= 2.66, (WM)= 2.75, (WM)= 2.80, (WM)= 2.70, (WM)= 2.68, and (WM)= 2.77, respectively.
This implied that the mentor encourages students to prioritize goal setting, encourages mindfulness, encourages to always express gratitude to fellow students and teachers, emphasize to students the growth mindset as they mature, emphasize to celebrate success with fellow students, teachers, friends, and family, inculcate students to avoid negative remarks, and reinforce the value of interactive learning, respectively. Moreover, the total Weighted Mean (WM) of 2.85 in the research context can be interpreted to mean that the respondents had agreed in terms of the positive attitude acquisition in Circuits 1.

Based on the results of the survey on positive attitude acquisition of students in circuits 1, it appears that the teacher's effective teaching strategies helped to cultivate the student’s positive attitude, which will certainly help achieve the goals of the outcome-based education program. This has also been proven in studies conducted by Rathy et al. (2020), Nirmala R. (2020), and Hamidi H. et al. (2024) that when students are taught properly by teachers, and learn a positive attitude, they can use it to create various designs for laboratory experiments related to technology, mathematics, and direct current circuit analysis. In addition, the study of circuits 1 network analysis particularly the Ohm’s Law, Kirchhoff’s Law, including Norton’s Law, Thevenin’s Law, and other complex circuits analysis that requires patience of students that are coming from the acquired positive attitude in the study of an outcome-based education program in Electronics Engineering.

Table 7
Feedback on the Performance evaluation parameter of the mentor in Circuits 1

OBE LEARNING ATTAINABILITY EXTENT	WEIGHTED MEAN (WM)	VERBAL INTERPRETATION
1. The mentor discusses the mechanics of OBE grading system…	2.61	Agree
2. Gives an example for the computation of OBE grading system…	2.53	Agree
3. Gives the criteria of grading system for knowledge gain of OBE…	2.55	Agree
4. Gives the criteria of grading system for the skills learned in OBE…	2.69	Agree
5. Gives the criteria of grading system for the positive attitude and behavior acquired in OBE…	1.51	Moderately Agree
6. Calls the attention of student if there is a lacking requirement from students…	2.58	Agree
7. Shows the individual computation of grades based on OBE standard of ECE course…	1.52	Moderately Agree
	Total WM= 2.28	Moderately Agree

n= 50, ± 2% margin of error

Table 7 above reflects the feedback of respondents on the performance evaluation parameter of the mentor in Circuits 1. There were 50 respondents and set at a ± 2% margin of error. Five items fell in the category of "AGREE," which are items 43, 44, 45, 46, and 48 that correspond to the weighted means of (WM)= 2.61, (WM)= 2.53, (WM)= 2.55, (WM)= 2.69, and (WM)= 2.58, respectively. This implied that the mentor discussed the mechanics of OBE grading system, was able to give an example for the computation of OBE grading system, gave the criteria of grading system for knowledge gain of OBE, gave the criteria of grading system for the skills learned in OBE, was able to call the attention of student if there is a lacking requirement from students, respectively. In addition, there were two (2) items that fell in the category of "MODERATELY AGREE"; these items are 47 and 49, which correspond to (WM)=
1.51 and (WM)= 1.52. Which further implied that the mentor has been able to moderately give the criteria of grading system for the positive attitude and behavior acquired in OBE and has been able to moderately show the individual computation of grades based on OBE standard of ECE course. Moreover, the total Weighted Mean (WM) of 2.28 in the research context can be interpreted to mean that the respondents had moderately agreed in terms of the performance evaluation parameter of the mentor.

Having a clear mechanism for calculating student grades, particularly for performance evaluation, which includes class standing and major examinations as part of the learning process, is something students need to see how their grades are calculated, especially for the essentials of class standing like quizzes, seat works, recitation, board works, term papers, homework, and projects. Students often don't understand why their grade is lower than their classmates' even though they are the leader of their group, making it difficult for them to accept that the teacher did not demonstrate or explain the method of calculating grades. In similar studies and research conducted by G. Zhang and L. Fan (2019), Kavitha K. & Karthika K. (2023), Arunkumar, S., S. Sasikala, and K. Kavitha (2018), and it appears that students have many questions about the grades they receive for the mentioned parts of class standing, which the teacher rarely does, such as recitation, yet they receive a grade even though they were not called upon to participate in the recitation. In that case, to ensure that students' grades for each component of class standing are clear and transparent, school heads, teachers, and administrators should hold consultations to publish a uniform mechanism for computing grades throughout the school. In addition, this can be implemented by the deans in all colleges of the university so that every subject teacher will have the same method for computing students' class standing. Moreover, the recalibration of the outcome-based education program in the College of Engineering should also be implemented in other colleges of Quezon City University. It would be great if this could be discussed and resolved during the academic council meeting and presented to the relevant authorities, especially the university's academic affairs unit.

Table 8
Feedback on Attainability of Learning Objectives and Adequacy of Instructional Materials in Circuits 1

OBE LEARNING ATTAINABILITY EXTENT	WEIGHTED MEAN (WM)	VERBAL INTERPRETATION
1. The mentor introduces the necessary tools, machinery, and test equipment for the project making in Circuits I…	2.71	Agree
2. Discusses the parts of necessary tools, machinery, and test equipment, including how the tools and testers are being operated…	2.69	Agree
3. Introduces the importance of safety measures in the workplace using the occupational safety and health standards in the electronics engineering laboratory…	2.93	Agree
4. Introduces electronic supplies such as resistors, capacitors, inductors, transistors, ICs, diodes, transformers, and other supplemental electronics supplies for laboratory experiments…	2.87	Agree
5. Discusses manuals in operation for the assembly of electronic kits and	2.74	Agree

Table 8 above reflects the feedback of respondents on Attainability of Learning Objectives and Adequacy of Instructional materials in Circuits 1. There were 50 respondents and set at a ± 2% margin of error. Seven items fell in the category of “AGREE,” which are items 50, 51, 52, 53, 54, 55, and 56 that correspond to the
weighted means of (WM)= 2.71, (WM)= 2.69, (WM)= 2.93, (WM)= 2.87, (WM)= 2.74, (WM)= 2.81, and (WM)= 2.77, respectively. This implied that the mentor encourages students to prioritize goal setting, encourages mindfulness, encourages to always express gratitude to fellow students and teachers, emphasize to students the growth mindset as they mature, emphasize to celebrate success with fellow students, teachers, friends, and family, inculcate students to avoid negative remarks, and reinforce the value of interactive learning, respectively. Moreover, the total Weighted Mean (WM) of 2.85 in the research context can be interpreted to mean that the respondents had agreed in terms of the positive attitude acquisition in Circuits 1.

The result in the last part of the survey regarding attainability of learning objectives and adequacy of instructional materials in circuits 1 has been a good indicator that the college of electronics engineering has adequate instructional materials to achieve the learning objectives for the study of circuits 1 outcome-based education program. Having adequate instructional materials makes it easier for students to study, especially in subjects with lecture and laboratory classes. Similar studies conducted by R. Gurukkal (2020), D. Pradhan (2021), at R. Yusof, et al (2017) stated that when the classroom becomes a school laboratory equipped with the necessary materials for conducting laboratory experiments in Circuits 1, learning objectives are more easily achieved if the equipment is complete, including a function generator, oscilloscope, and applications with multiple circuit simulators. Essential electronic components such as resistors, capacitors, inductors, transistors, transformers, integrated circuits (ICs), and other necessary equipment should not be missing to achieve the learning objectives of the Circuits 1 OBE program.

Challenges and opportunities in the implementation of the OBE syllabus in Circuit I

Table 9
Assessment on Challenges for the Implementation of the Circuits I OBE Program

STUDENTS ASSESSMENT ON CHALLENGES FOR THE IMPLEMENTATION OF THE CIRCUITS I OBE PROGRAM	f	%
1. In terms of performance evaluation parameters, the mentor moderately showed the individual computation of grades based on the OBE standard of the Circuits I, particularly in board work, recitation, and seatwork.	18	36.00%
2. The mentor had a hard time discussing the learning objectives and their attainability.	12	24.00%
3. The mentor is moderately proficient in using clear and concise language and moderately uses body language to catch students' attention.	10	20.00 %
4. In terms of performance evaluation parameters, the mentor moderately gave the criteria of the grading system for the positive attitude and behavior acquired in OBE.	7	14.00%
5. Although, highly proficient in circuits I, the mentor had a hard time discussing the topic clearly in terms of communication skills in the delivery of lesson.	3	5. 6.00%
TOTAL:	**50**	**100.00%**

CONCLUSION

Based on the results and findings of this study, the researchers conclude that the implementation of the Outcome-Based Education (OBE) program in the Circuits I course of the Electronics Engineering (ECE) program at Quezon City University has generally received favorable feedback from students, albeit with certain areas requiring improvement. Students expressed both positive and moderate perceptions of the mentors' capabilities in executing the principles and strategies of the OBE framework. In particular, there was high agreement regarding the mentors' proficiency in the subject matter, especially in delivering content that connected theoretical knowledge with real-world applications. Moreover, students affirmed that learning objectives were clearly introduced, and that the course content supported the attainment of those objectives through well-structured lessons, relevant examples, and reinforcement through assessments and assignments.

With regard to communication skills, students acknowledged the mentors' ability to foster engagement and discussion, although some indicated that clearer articulation of complex topics and more effective use of instructional language could further enhance learning. Positive feedback was also given on the mentors' efforts to promote active learning, including the use of relevant questioning techniques, feedback mechanisms, and interactive discussions. In terms of student learning outcomes, the majority of respondents agreed that the course successfully facilitated the acquisition of knowledge, technical skills, and positive attitudes, including goal-setting, mindfulness, and collaborative values—core to the expected graduate attributes under the OBE model.

However, the study also identified key challenges. Notably, some students observed inconsistencies in how performance evaluation criteria—especially those related to attitude and behavior—were communicated and applied. There were also concerns about the lack of transparency in the grading process, particularly in computing individual class standing components such as recitation, board work, and seatwork. While mentors were largely recognized for their expertise, a number of students noted occasional difficulties in understanding the lesson delivery, suggesting a need for improved instructional clarity.

In response to these findings, the researchers recommend several strategic actions to strengthen the implementation of the OBE program in the ECE curriculum. First, the department should revisit and further refine its program outcomes to ensure they are aligned not only with Republic Act 9292 and CHED Memorandum Order No. 101, Series of 2017, but also with international standards for engineering education. These outcomes must be clear, realistic, measurable, and supported by outcome-based indicators that effectively assess the mastery of content, communication skills, learning attainability, and student development in terms of knowledge, skills, and attitudes. The development and institutionalization of these metrics would serve as a basis for regular program review and instructional improvement.

Second, the university should invest in the continuing professional development of ECE faculty by providing training and seminars on modern teaching methodologies, communication enhancement, and OBE-based assessment strategies. To address issues related to grading transparency, a standardized and unified grading system must be adopted, with clear guidelines on the percentage allocation for various components such as quizzes, recitations, homework, and projects. These guidelines should be discussed with students at the start of the semester and made available throughout the course to build trust and accountability in academic evaluation.

By implementing these recommendations, the College of Engineering will be better positioned to optimize the OBE framework, reinforce student-centered learning, and fulfill QCU's mission of producing globally competitive, industry-ready graduates. This continuous feedback loop between students and the academic program will further enhance teaching effectiveness, curriculum responsiveness, and institutional commitment to quality higher education.

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Labor Market Demand 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

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ABSTRACT

This study entitled "Labor Market Demand 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," will be conducted to determine the effectiveness of the OBE On the Job Training program outcomes and course outcomes. Specifically, (1) To determine the attainability of program outcomes relative to (1.1) ability to apply knowledge of mathematics and science to solve complex engineering problems; (1.2) Ability to design and conduct experiments, as well as to analyze and interpret data; (1.3) Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards; (1.4) Ability to function on multidisciplinary team s; (1.5) Ability to identify, formulate, and solve complex engineering problems; (1.6) Understanding of professional and ethical responsibility; (1.7) Ability to communicate effectively; (1.8) Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context; (1.9) Knowledge of contemporary issues; (1.10) Ability to use techniques, skills, and modern engineering tools necessary for engineering practice; (1.11) Knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments; (1.12)ability to design, develop, implement, and improve integrated systems that include people, materials, information, equipment and energy. (2) To determine the attainability of course outcomes relative to: (2.1) theories learned in school to the actual technical and/or practical

solutions to industrial problems; (2.2) Familiarization with varied plant operations and processes, operational techniques used and current management control; (2.3) Development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to Industrial Engineering; and (2.4) Development of good human relations in industrial operations. (3) To determine the current labor market demand and the training needs to the Industrial Engineering Graduates who are currently employed in selected manufacturing industries in the National Capital Region. In addition, the materials needed in this study are: Industrial Engineering OJT OBE Syllabus, Updated BSIE curriculum series of 2024, BSIE CHED Standard Curriculum series of 2017, BSIE OJT standard policy, QCU Student Manual, Existing MOA for OJT students of QCU, Industry partners, and collection of OJT portfolio of the BSIE graduates. Further, the study employed both descriptive-quantitative and qualitative techniques, while the data analytics applied the 4-point Likert scale, weighted mean, including the frequency and percentage formula using the google statistics calculator for non-parametric categorical qualitative and numerical. The collection of research abstract selection for OBE program applied artificial intelligence for fast and efficient research abstract collection strategy.

INTRODUCTION

The Quezon City University College of Engineering is on its way to conceptualizing improving the outcome-based education (OBE) program of the Bachelor of Science in Industrial Engineering in order to meet the current demands of the labor market in the manufacturing industries, considering the changes in the dynamic world of employment requirements in the job market that is continuously seeking highly qualified Industrial Engineering graduates that will respond to the workforce that is increasingly becoming competitive. According to the Rochester Institute of Technology (2025), labor market demand for industrial engineering graduates is stable and projected to grow fast in the coming years. The Bureau of Labor Statistics (BLS) in the United States predicted close to more or less than 10% growth in job hiring for deserving and highly qualified industrial engineers from 2021 to 2031; that is closer than the mean for all types of jobs in the field of industrial engineering. This growth is driven by the versatility of industrial engineers and the need for their expertise in various industries. The increasing demand for the labor market and job market is an economic theory that came from the demand for supplies from job applicants. Which means if employers petition for industry productivity, the industry will demand more labor, therefore needing to hire more workers. In addition, when the demand for high productivity output rises, both the productivity cost and profitability increase. Consequently, manufacturers seek more workers to leverage production of industrial manufacturing firms. Therefore, a well-trained and well-educated industrial engineer workforce grounds an increase in the demand for that productivity by employers.

The Commission on Higher Education Memorandum Order no. 96 series of 2017 for the Bachelor of Science in Industrial Engineering Program considered the Outcome-Based Education to be the driving motivation for maintaining or even continuously innovating the current OBE program of many Higher Education Institutions (HEIs). Outcome-Based Education (OBE) is vital in terms of upgrading the knowledge and skills of industrial engineering students because it anchors on what the learners should learn and be able to perform after graduation, rather than just the content of the program covered in the course of study. Such method ensures Industrial Engineering graduates are prepared with the applied skills, competencies, and abilities needed to meet labor market demands in industrial manufacturing firms, leading to augmented level of employability, coherent ability to perform a relevant job for industrial engineers. In order to be prepared with these relevant skills, Industrial Engineering graduates should be armed with (1) ability to apply knowledge of mathematics and science to solve complex engineering problems; (2) Ability to design and conduct experiments, as well as to analyze and interpret data; (3) Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards; (4) Ability to function on multidisciplinary team s; (5) Ability to identify, formulate, and solve complex engineering problems; (6) Understanding of professional and ethical responsibility; (7) Ability to communicate effectively; (8) Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context; (9) Recognition of the need for, and an ability to engage in life-long learning; (10) Knowledge of contemporary issues; (11) Ability to use techniques, skills, and modern engineering tools necessary for engineering practice; (12) Knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments; (13) ability to design, develop, implement, and improve integrated systems that include people, materials, information, equipment and energy. Moreover, it is understood that the industrial engineering graduates candidate for the labor market demand should demonstrate skills as a matter of evidence of students subjection to course outcome such as (1) theories learned in school to the actual technical and/or practical solutions to industrial problems; (2) Familiarization with varied plant operations and processes, operational techniques used and current management control; (3) Development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to Industrial Engineering; and (4) Development of good human relations in industrial operations. Furthermore, the outcome-based education program of Quezon City University College of Engineering is in view of its core values stated in its mission thus vision to wit: Qualified in their chosen field locally and globally, Competent and effective communicators, Unique in demonstrating their sense of genuine nationalism and patriotism. Thus, employers who seek such qualifications must consider the Bachelor of Science in Industrial Engineering graduates of Quezon City University.

Giving due consideration to the above narratives, the researchers deemed it necessary to conduct research on “Labor Market Demand 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.” In addition, this research is put to conceptualization to determine the current needs of the succeeding On the Job Training students and to determine further what the result of this study can offer to calibrate the current OBE curriculum to meet the demands in the Job Market and Labor Market. These are the compelling reasons for conducting this study.

Conceptual Framework

Recognizing the importance of a Conceptual Framework that is particularly providing a bird’s eye view to the research process from the initial phase and the succeeding phases up to the final phase of the study, the researchers employed the Three (3) Phase model of the research paradigm that gives conceptualization in the figure 1 below.

Figure 1
Three Phase Model of the Study

PHASE 1 PROACTIVE PHASE	PHASE 2 ACTIVE PHASE	PHASE 3 REACTIVE PHASE
1. Identifying ongoing issues for OJT program 2. Selection of Industrial Engineering graduates who are currently occupying respective positions in the labor market 3. Identifying selected Industrial Engineering Companies where BSIE graduates are currently employed 4. Collection of relevant research materials 5. Coordinating research activities to BSIE chairperson and industry partners 6. Initial Interview and coordination with BSIE graduates who are currently employed in selected industrial engineering companies 7. Initial review of relevant OBE OJT collection of research abstract	8. Submission of research proposal 9. Coordination of research activities with research collaborators, respondents and industry partners 10. Writing the draft of research abstract 11. Writing the draft of research paper rationale 12. Writing the draft of research objectives 13. Writing the draft of conceptual framework 14. Formulation of survey questionnaire, data analytics, and writing the draft of research methodology.	1. Labor Market Demand of Industrial Companies to the OJT OBE Program in the College of Engineering of Quezon City University 2. Recommendation for the training needs of succeeding Industrial Engineering OJT Students

Figure 1 above shows the Three-Phase model for the development of conceptual framework of the present study. The PROACTIVE PHASE includes identifying ongoing issues for OJT program, selection of Industrial Engineering graduates who are currently occupying respective positions in the labor market, identifying selected Industrial Engineering Companies where BSIE graduates are currently employed, collection of relevant research materials, coordinating research activities to BSIE chairperson and industry partners, Initial Interview and coordination with BSIE graduates who are currently employed in selected industrial engineering companies, initial review of relevant OBE OJT collection of research abstract. In addition, the ACTIVE PHASE includes submission of research proposal, coordination of research activities with research collaborators, respondents and industry partners, writing the draft of research abstract, writing the draft of research paper rationale, writing the draft of research objectives, writing the draft of conceptual framework, formulation of survey questionnaire, data analytics, and writing the draft of research methodology. Lastly, the REACTIVE PHASE of this research paper is the Labor Market Demand of Industrial Companies to the OJT OBE Program in the College of Engineering of Quezon City University and recommendation for the training needs of succeeding Industrial Engineering OJT Students.

There are many studies about outcome-based education that are already mentioned in previous studies, such as Xin & Liyong (2018), Hassan (2012), and Ying & Zhao (2021), which mentioned the advantages and disadvantages of an outcome-based education program; however, these studies did not warrant a full attainment of the OBE objectivity; instead, the studies arrived at recommendations to recalibrate the program outcomes and the course outcomes of the study that will respond to the demands of many industrial companies to respond to their current job market and labor market demand. In a similar study conducted by Abana (2020) entitled “Engineering Students’ Evaluation of their On-the-Job Training Program” assessed the implementation of the On-the-Job Training program of the University of Saint Louis specifically in the Civil Engineering, Electrical Engineering, Electronics Engineering and Computer Engineering programs. The respondents of the study were the 183 Civil Engineering, Electrical Engineering, Electronics Engineering, and Computer Engineering students who had their OJT last summer of school year 2018-2019. The results revealed that the different provisions of the On-the-Job Training program of the School of Engineering, Architecture, and Information Technology Education were implemented but there were some provisions that need to be worked on by the different engineering programs. The OJT program was effective in providing an actual working environment that will help prepare the students with the challenges they will face in their future workplaces. While the present study will investigate the labor market demands of the companies where the on-the-job training students in industrial engineering of Quezon City University rendered their OJT program. In addition, the present study will try to look into the attainability of the OJT program outcomes and the attainability of the course outcome particularly ability to apply knowledge of mathematics and science to solve complex engineering problems; ability to design and conduct experiments; as well as to analyze and interpret data; ability to design a system, component; or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards; ability to function on multidisciplinary teams, ability to identify, formulate, and solve complex engineering problems; understanding of professional and ethical responsibility; ability to communicate effectively; broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context, recognition of the need for; ability to engage in life-long learning, knowledge of contemporary issues, ability to use techniques, skills, and modern engineering tools necessary for engineering practice and knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments; ability to design, develop, implement, and improve integrated systems that include people, materials, information, equipment and energy. The course outcomes are relate theories learned in school to the actual technical and/or practical solutions to industrial problems; familiarization with varied plant operations and processes, operational techniques used and current management control; develop responsible attitude and self-motivation by systematically handling task in design and other activities relevant to Electronics Engineering; and develop good human relations in industrial operations.

Objectives of the Study

This 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,” will be conducted to determine the effectiveness of the OBE On the Job Training program outcomes and course outcomes and how the OJT students’ performance responds to their respective employers. Specifically, the objectives of the study are:

1. To determine the attainability of program outcomes relative to:
   a) Ability to apply knowledge of mathematics and science to solve complex engineering problems.
   b) Ability to design and conduct experiments, as well as to analyze and interpret data.
   c) Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical,

health and safety, manufacturability, and sustainability, in accordance with standards.

d) Ability to function on multidisciplinary team s.
e) Ability to identify, formulate, and solve complex engineering problems.
f) Understanding of professional and ethical responsibility
g) Ability to communicate effectively.
h) Broad education is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) Knowledge of contemporary issues.
j) Ability to use techniques, skills, and modern engineering tools necessary for engineering practice.
k) Knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments.
l) Ability to design, develop, implement, and improve integrated systems that include people, materials, information, equipment and energy.

2. To determine the attainability of course outcomes relative to:
   a) Theories learned in school in the actual technical and/or practical solutions to industrial problems.
   b) Familiarization with varied plant operations and processes, operational techniques used and current management control.
   c) Development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to Industrial Engineering.
   d) Development of good human relations in industrial operations.

3. To determine the current labor market demand and the training needs of the Industrial Engineering Graduates who are currently employed in selected manufacturing industries in the National Capital Region.

METHODS

As a matter of realization to the program outcome objectivity and the course outcome objectivity there is a need to assess the on-going issues about the attainability of the current OBE on-the-job training program effectiveness and its coherence to the labor market demands with the industrial engineering firms where the Bachelor of Science in Industrial Engineering OJT students rendered its services. In order to achieve this, the researchers employed descriptive-qualitative and descriptive-quantitative techniques. Further, to determine the effectiveness of the On the job training OBE program of the Bachelor of Science in Industrial Engineering curriculum, assessment from students should be given attention to the validity of OBE implementation. This study involved strategies for efficient data collection techniques that include processes and procedures, including the statistical tools used in this study. Further, the researchers employed documentary analysis of the OJT plans and program that includes the materials required in this study which are: CMO for BSIE program, BSIE curriculum, Ergonomics Syllabus, Industrial Materials and Processes (LEC) Syllabus, learning resources including manuals and safety measures, respectively with respect to CMO 101 series of 2017, while the descriptive-qualitative technique is used to describe, analyze, and interpret the responses of respondents with the aid of percentage formula that is available via online search in google statistical formula.

1. Respondents of the Study. The researchers sought permission to conduct research

from University Officials including permission from the respondents who will participate in the data collection using the survey questionnaire, where 15 days is allotted to evaluate and validate the survey questionnaire given to each of the respondents. This is done in compliance with the research ethical standards of the university and in compliance with the data privacy policy for research data appropriate action and utilization. The respondents of the study are the on the job training BSIE students who graduated during SY 2024-2025 who are subjected to pre-qualification to ensure that they know the required data they need to prepare prior to answering the survey questionnaire.

2. Population and sampling frame. The respondents of the study were 54 BSIE graduates who rendered on the job training in selected industrial manufacturing in the National Capital Region Oriental Tin Can & Metal Sheet Mfg.; Perfumity LLC; Sportslandia; AFPENULIAR CONSTRUCTION; Poly-Foam RGC International Corporation | Uratex; Land Transportation Office; Servicio Filipino, Inc.; Aire Temp Technologists; Indentrade Systems Corp.
   a) CLEAN WORLD TRADING & SUPPLIES INC.
   b) Bewell Nutraceuticals Corporation, respectively.
   c) SMILE STATION DENTAL CENTER
   d) HAYAMA INDUSTRIAL CORPORATION
   e) Department of Social Welfare and Development (DSWD)
   f) Cathay Metal Corporation
3. Research instrument. The research instrument used in this study are composed of
   a) Part 1: Assessment to the OJT program objectives
   b) PART 2 ASSESSMENT OF STUDENTS TO THE OJT COURSE OUTCOMES AND
   c) PART 3: To determine the current labor market demand and the training needs of the Industrial Engineering Graduates who are currently employed in selected manufacturing industries in the National Capital Region.
4. Validation of research instrument. In order to validate the questionnaire of this present study, the researchers conducted a consultation meeting with the area chairperson of the Bachelor of Science in Industrial Engineering to ascertain the number of respondents, the number of participants in the research survey validation dry run including the actual interview with some BSIE graduates who are already employed in the selected industrial manufacturing firms in Quezon City. After the consultation meeting and interviews the researchers drafted the content of research questionnaire and subjected to dry run. The researchers made it sure that the contents of the research questionnaire are complete relevant and coherent to the research objectivity.
5. Data gathering procedure. After the research instrument was evaluated, validated, and calibrated, the researchers then asked the permission of the college dean of engineering and the area chairperson of industrial engineering. The researchers sought permission to conduct a survey among the industrial engineering graduates who are the respondents to the study. The research instrument is created in electronic form and distributed to the respondents via the Internet with the help of previous teachers who handled the respondents of the study to facilitate the distribution of the survey questionnaire. Fifteen (15) days were allotted to answer the said survey questionnaire to give the respondents enough time to read and understand the content of the survey questionnaire as reflected in Appendix A. After the fifteen-day period, the researchers then collected the survey questionnaire, after which it was tallied and tabulated.
6. Data analytics and statistical treatments. In this particular study, the data analytics used is a quantitative data analytic model which is the percentage with the formula %=number of sample size/ total number of respondents x 100%. In addition the

researchers employed the 3-point Likert scale to interpret the weighted mean for the qualitative data set to analyze and interpret the responses of the respondents.

RESULTS AND DISCUSSION

As already mentioned in the previous section of this research paper, this study is aimed to achieve the following objectives: (1) To determine the attainability of program outcomes relative to (1.1) ability to apply knowledge of mathematics and science to solve complex engineering problems; (1.2) Ability to design and conduct experiments, as well as to analyze and interpret data; (1.3) Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards; (1.4) Ability to function on multidisciplinary team s; (1.5) Ability to identify, formulate, and solve complex engineering problems; (1.6) Understanding of professional and ethical responsibility; (1.7) Ability to communicate effectively; (1.8) Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context; (1.9) Knowledge of contemporary issues; (1.10) Ability to use techniques, skills, and modern engineering tools necessary for engineering practice; (1.11) Knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments; (1.12)ability to design, develop, implement, and improve integrated systems that include people, materials, information, equipment and energy. (2) To determine the attainability of course outcomes relative to: (2.1) theories learned in school to the actual technical and/or practical solutions to industrial problems; (2.2) Familiarization with varied plant operations and processes, operational techniques used and current management control; (2.3) Development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to Industrial Engineering; and (2.4) Development of good human relations in industrial operations. (3) To determine the current labor market demand and the training needs to the Industrial Engineering Graduates who are currently employed in selected manufacturing industries in the National Capital Region. The data collected for this study are hereto presented, discussed, analyzed and interpreted in the succeeding tables.

PART I

TABLE 1

Assessment of Respondents on Attainability of Program Outcomes relative to the Ability to Apply Knowledge of Mathematics and Science to Solve Complex Engineering Problems
(n=50, ± 2% margin of error, 95% confidence level)

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE ABILITY TO APPLY KNOWLEDGE OF MATHEMATICS AND SCIENCE TO SOLVE COMPLEX ENGINEERING PROBLEMS	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	Total WM: 2.83	AGREE

Table 1 above shows the assessment of respondents on the attainability of program outcomes relative to the ability to apply knowledge of mathematics and science to solve complex engineering problems with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of OBE OJT program outcome attainability relative to the ability to apply knowledge of mathematics and science to solve complex engineering problems revealed that item 1, "the OJT program resulted to the respondent's ability to apply knowledge of mathematics" with a weighted mean of 2.90 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted in the respondent's ability to apply knowledge in scientific methods in the workplace with a weighted mean of 2.88 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondents was able to apply the knowledge in solving complex engineering problems as shown by the weighted mean of 2.71 with a verbal interpretation of Agree. This implied that the assessment of respondents on the attainability of program outcomes relative to the ability to apply knowledge of mathematics and science to solve complex engineering problems is rated at the total weighted mean of 2.83 or agree which implied that the assessment on the program outcome was generally attained.

TABLE 2

Assessment of Respondents on Attainability of Program Outcomes relative to the Ability to Design and Conduct Experiments, as well as to Analyze and Interpret Data
(n=50, ± 2% margin of error, 95% confidence level)

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE ABILITY TO DESIGN AND CONDUCT EXPERIMENTS, AS WELL AS TO ANALYZE AND INTERPRET DATA	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted to the respondent's ability to design experiments…	2.88	AGREE
Resulted to the respondent's ability to conduct experiments …	2.83	AGREE
Was able to apply the knowledge in analyze and interpret data…	2.11	MODERATELY AGREE
TOTAL	Total WM: 2.61	AGREE

Table 2 above shows the assessment of respondents on attainability of program outcomes relative to the ability to design and conduct experiments, as well as to analyze and interpret data with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of program outcomes relative to the ability to design and conduct experiments, as well as to analyze and interpret data revealed that item 1, "The OJT program resulted to the respondent's ability to design experiments" with a weighted mean of 2.88 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's ability to conduct experiments with a weighted mean of 2.83 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted that the respondents was moderately able to apply the knowledge in analyze and interpret data as shown by the weighted mean of 2.11 with a verbal interpretation of Moderately Agree. This implied that the assessment of respondents on attainability of program outcomes relative to the ability to design and conduct experiments, as well as to analyze and interpret data is rated at the total weighted mean of 2.61 or agree which implied that the assessment on the program outcome was generally attained.

TABLE 3
Assessment of Respondents on Attainability of Program Outcomes relative to the Ability to Design a System, Component, or Process to meet desired needs within Realistic Constraints
(n=50, ± 2% margin of error, 95% confidence level)

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE ABILITY TO DESIGN A SYSTEM, COMPONENT, OR PROCESS TO MEET DESIRED NEEDS WITHIN REALISTIC CONSTRAINTS	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted to the respondent's ability to design systems…	1.72	MODERATELY AGREE
Resulted to the respondent's ability to design	2.80	AGREE
Ability to adopt social, ethical, health and safety, manufacturability, and sustainability in accordance with standards…	2.75	AGREE
Total	Total WM: 2.42	MODERATELY AGREE

Table 3 above shows the assessment of respondents on attainability of program outcomes relative to the ability to design a system, component, or process to meet desired needs within realistic constraints with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of program outcomes relative to the ability to design a system, component, or process to meet desired needs within realistic constraints revealed that item 1, the OJT program resulted to the respondent's ability to design systems, with a weighted mean of 1.72 with a verbal interpretation of Moderately Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's ability to design processes with a weighted mean of 2.80 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to adopt social, ethical, health and safety, manufacturability, and sustainability in accordance with standards as shown by the weighted mean of 2.75 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of program outcomes relative to the ability to design a system, component, or process to meet desired needs within realistic constraints is rated at the total weighted mean of 2.42 or moderately agree which implied that the assessment on the program outcome was moderately attained.

TABLE 4

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

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE ABILITY TO FUNCTION ON MULTIDISCIPLINARY TEAMS	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted to the respondent's ability to function on multidisciplinary teams …	2.77	AGREE
Ability to share his learned knowledge that contributes to the objectives of the team…	1.80	MODERATELY AGREE
Ability to share his experiences that contributes to the objectives of the team…	2.89	AGREE
TOTAL	Total WM: 2.49	MODERATELY AGREE

Table 4 above shows the assessment of respondents on attainability of program outcomes relative to the ability to function on multidisciplinary teams with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of program outcomes relative to the ability to function on multidisciplinary teams revealed that item 1, the OJT program resulted to the respondent's ability to function on multidisciplinary teams, with a weighted mean of 2.77 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's ability to share his learned knowledge that contributes to the objectives of the team with a weighted mean of 1.80 with a verbal interpretation of Moderately agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to share his experiences that contributes to the objectives of the team as shown by the weighted mean of 2.89 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of program outcomes relative to the ability to function on multidisciplinary teams is rated at the total weighted mean of 2.49 or moderately agree which implied that the assessment on the program outcome was moderately attained.

TABLE 5

Assessment of Respondents on Attainability of Program Outcomes relative to the Ability to Identify, Formulate, and Solve Complex Engineering Problems (n=50, ± 2% margin of error, 95% confidence level)

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE ABILITY TO IDENTIFY, FORMULATE, AND SOLVE COMPLEX ENGINEERING PROBLEMS	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted to the respondents ability to identify complex engineering problems…	2.60	AGREE
Ability to formulate complex engineering problems …	2.78	AGREE
Ability to solve complex engineering problems…	1.76	MODERATELY AGREE
TOTAL	Total WM: 2.38	MODERATELY AGREE

Table 5 above shows the assessment of respondents on attainability of program outcomes relative to the ability to identify, formulate, and solve complex engineering problems with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of program outcomes relative to the ability to identify, formulate, and solve complex engineering problems revealed that item 1, the OJT program resulted to the respondents ability to identify complex engineering problems, with a weighted mean of 2.60 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's ability to formulate complex engineering problems with a weighted mean of 2.78 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to solve complex engineering problems as shown by the weighted mean of 1.76 with a verbal interpretation of Moderately Agree. This implied that the assessment of respondents on attainability of program outcomes relative to the ability to identify, formulate, and solve complex engineering problems is rated at the total weighted mean of 2.38 or moderately agree which implied that the assessment on the program outcome was moderately attained.

TABLE 6

Assessment of Respondents on Attainability of Program Outcomes relative to the Understanding of Professional And Ethical Responsibility (n=50, ± 2% margin of error, 95% confidence level)

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE UNDERSTANDING OF PROFESSIONAL AND ETHICAL RESPONSIBILITY	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted to the respondents understanding of professional responsibility…	2.69	AGREE
Understanding ethical responsibility…	2.78	AGREE
Understanding and ability to relate and adjust to appropriate human behavior in a team…	2.84	AGREE
TOTAL	Total WM: 2.77	AGREE

Table 6 above shows the assessment of respondents on attainability of program outcomes relative to the understanding of professional and ethical responsibility with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of program outcomes relative to the understanding of professional and ethical responsibility revealed that item 1, the OJT program resulted to the respondents understanding of professional responsibility, with a weighted mean of 2.69 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's understanding ethical responsibility with a weighted mean of 2.78 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's understanding and ability to relate and adjust to appropriate human behavior in a team as shown by the weighted mean of 2.84 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of program outcomes relative to the understanding of professional and ethical responsibility is rated at the total weighted mean of 2.77 or agree which implied that the assessment on the program outcome was generally attained.

TABLE 7

Assessment of Respondents on Attainability of Program Outcomes relative to the ABILITY TO COMMUNICATE EFFECTIVELY (n=50, ± 2% margin of error, 95% confidence level)

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE ABILITY TO COMMUNICATE EFFECTIVELY	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted to the respondents Ability to write a narrative report about ongoing	2.82	AGREE
Ability to analyze specific issues and communicate possible solution…	1.74	M AGREE
Ability to suggest better options to improve performance within the team and to the upper	2.65	AGREE
TOTAL	Total WM: 2.37	MODERATELY AGREE

Table 7 above shows the assessment of respondents on attainability of program outcomes relative to the ability to communicate effectively with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of program outcomes relative to the ability to communicate effectively understanding of professional and ethical responsibility revealed that item 1, the OJT program resulted to the respondents Ability to write a narrative report about ongoing issues in the workplace, with a weighted mean of 2.82 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's ability to analyze specific issues and communicate possible solution with a weighted mean of 1.74 with a verbal interpretation of moderately agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to suggest better options to improve performance within the team and to the upper management level as shown by the weighted mean of 2.65 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of program outcomes relative to the ability to communicate effectively is rated at the total weighted mean of 2.37 or moderately agree which implied that the assessment on the program outcome was moderately attained.

TABLE 8

Assessment of Respondents on Attainability of Program Outcomes relative to the Broad education is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(n=50, ± 2% margin of error, 95% confidence level)

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE BROAD EDUCATION NECESSARY TO UNDERSTAND THE IMPACT OF ENGINEERING SOLUTIONS IN A GLOBAL, ECONOMIC, ENVIRONMENTAL, AND SOCIETAL CONTEXT	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted in the respondents' broad education necessary to understand the impact of engineering solutions in a global context…	2.94	AGREE
Broad education necessary to understand the impact of engineering solutions in an economic and environmental context.	2.83	AGREE
Broad education necessary to understand the impact of engineering solutions in societal context.	2.77	AGREE
TOTAL	Total WM: 2.85	AGREE

Table 8 above shows the assessment of respondents on the attainability of program outcomes related to the broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal contexts with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. Item 1 reveals that respondents agree that the OJT program delivered the broad education needed to comprehend the impact of engineering solutions in a global context, with a weighted mean of 2.94. Item 2 reflects the assessment on broad education enables understanding of the economic and environmental dimensions of engineering solutions, yielding a weighted mean of 2.83. Item 3 similarly indicates assessment regarding understanding the societal impact of engineering solutions, with a weighted mean of 2.77. This implied that the assessment of respondents on attainability of program outcomes relative to the Broad education is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context is rated at the total weighted mean of 2.85 or agree which implied that the assessment on the program outcome was attained.

TABLE 9

Assessment of Respondents on Attainability of Program Outcomes relative to the knowledge of contemporary issues (n=50, ± 2% margin of error, 95% confidence level)

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE KNOWLEDGE OF CONTEMPORARY ISSUES	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted to the respondent's consciousness in contemporary issues	2.89	AGREE
Ability to apply knowledge for contemporary issues…	2.93	AGREE
Ability to share his actual experience in the workplace about the contemporary issues…	2.67	AGREE
TOTAL	Total WM: 2.83	AGREE

Table 9 above shows the assessment of respondents on attainability of program outcomes relative to the knowledge of contemporary issues with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of program outcomes relative to the knowledge of contemporary issues revealed that item 1, the OJT program resulted in the respondents' consciousness in contemporary issues, with a weighted mean of 2.89 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's ability to apply knowledge for contemporary issues with a weighted mean of 2.93 with a verbal interpretation of moderately agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to share his actual experience in the workplace about the contemporary issues as shown by the weighted mean of 2.67 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of program outcomes relative to the knowledge of contemporary issues is rated at the total weighted mean of 2.83 or agree which implied that the assessment on the program outcome was generally attained.

TABLE 10

Assessment of Respondents on Attainability of Program Outcomes relative to the ability to use techniques, skills, and modern engineering tools (n=50, ± 2% margin of error, 95% confidence level)

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE ABILITY TO USE TECHNIQUES, SKILLS, AND MODERN ENGINEERING TOOLS	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted in the respondents' ability to use techniques necessary for engineering practice …	2.78	AGREE
Ability to use skills necessary for engineering practice…	2.69	AGREE
Ability to use modern engineering tools necessary for engineering practice…	2.83	AGREE
TOTAL	Total WM: 2.78	AGREE

Table 10 above shows the assessment of respondents on attainability of program outcomes relative to the ability to use techniques, skills, and modern engineering tools with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of program outcomes relative to the ability to use techniques, skills, and modern engineering tools revealed that item 1, The OJT program resulted in the respondents' ability to use techniques necessary for engineering practice, with a weighted mean of 2.78 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's ability to use skills necessary for engineering practice, with a weighted mean of 2.69 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to use modern engineering tools necessary for engineering practice as shown by the weighted mean of 2.83 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of program outcomes relative to the ability to communicate effectively is rated at the total weighted mean of 2.78 or agree which implied that the assessment on the program outcome was attained.

TABLE 11

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

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE KNOWLEDGE AND UNDERSTANDING OF ENGINEERING AND MANAGEMENT PRINCIPLES AS A MEMBER AND LEADER IN A TEAM	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	TOTAL WM: 2.76	AGREE

Table 11 above shows the assessment of respondents on attainability of program outcomes relative to the knowledge and understanding of engineering and management principles as a member and leader in a team with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of program outcomes relative to the ability to identify, formulate, and solve complex engineering problems revealed that item 1, the OJT program resulted to the respondents ability to identify complex engineering problems, with a weighted mean of 2.60 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's ability to formulate complex engineering problems with a weighted mean of 2.78 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to solve complex engineering problems as shown by the weighted mean of 1.76 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of program outcomes relative to the ability to identify, formulate, and solve complex engineering problems is rated at the total weighted mean of 2.38 or moderately agree which implied that the assessment on the program outcome was moderately attained.

TABLE 12

Assessment of Respondents on Attainability of Program Outcomes relative to the Ability To Design, Develop, Implement, And Improve Integrated Systems (n=50, ± 2% margin of error, 95% confidence level)

OBE OJT PROGRAM OUTCOME ATTAINABILITY RELATIVE TO THE ABILITY TO DESIGN, DEVELOP, IMPLEMENT, AND IMPROVE INTEGRATED SYSTEMS	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	Total WM: 2.50	AGREE

Table 12 above shows the assessment of respondents on attainability of program outcomes relative to the ability to design, develop, implement, and improve integrated systems with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of program outcomes relative to the ability to design, develop, implement, and improve integrated systems revealed that item 1, the OJT program resulted to the respondents ability to design and develop integrated systems, with a weighted mean of 1.91 with a verbal interpretation of Moderately Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent’s ability to implement integrated systems that include people, materials, information, equipment and energy, with a weighted mean of 2.75 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent’s ability to solve complex engineering problems as shown by the weighted mean of 1.76 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of program outcomes relative to the ability to improve integrated systems that include people, materials, information, equipment and energy is rated at the total weighted mean of 2.82 or Agree which implied that the assessment on the program outcome was attained.

PART II

TABLE 13
Assessment of Respondents on Attainability of Course Outcomes relative to the Theories Learned in School to the Actual Technical and/or Practical Solutions to Industrial Problems
(n=50, ± 2% margin of error, 95% confidence level)

OBE OJT COURSE OUTCOME ATTAINABILITY RELATIVE TO THE DEVELOPMENT OF RESPONSIBLE ATTITUDE AND SELF-MOTIVATION BY SYSTEMATICALLY HANDLING TASK IN DESIGN AND OTHER ACTIVITIES RELEVANT TO INDUSTRIAL ENGINEERING	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted in the respondents' development of responsible attitude in the workplace…	2.89	AGREE
Respondents' development of self-motivation to work actively and energetically to achieve goals…	2.63	AGREE
Development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to Industrial Engineering…	2.65	AGREE
	Total WM: 2.72	AGREE

Table 13 above shows the assessment of respondents on attainability of course outcomes relative to the theories learned in school to the actual technical and/or practical solutions to industrial problems with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of course outcomes relative to the theories learned in school to the actual technical and/or practical solutions to industrial problems revealed that item 1, the OJT program resulted to the respondents theories learned in school to the actual technical performance in the workplace, with a weighted mean of 2.78 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's ability to apply theories learned in the workplace, with a weighted mean of 2.63 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to apply practical solutions to industrial problems in the workplace as shown by the weighted mean of 2.84 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of course outcomes relative to the theories learned in school to the actual technical and/or practical solutions to industrial problems is rated at the total weighted mean of 2.75 or Agree which implied that the assessment on the course outcome was attained.

TABLE 14

Assessment of Respondents on Attainability of Course Outcomes relative to the Familiarization with Varied Plant Operations and Processes, Operational Techniques used and Current Management Control (n=50, ± 2% margin of error, 95% confidence level)

OBE OJT COURSE OUTCOME ATTAINABILITY RELATIVE TO THE FAMILIARIZATION WITH VARIED PLANT OPERATIONS AND PROCESSES, OPERATIONAL TECHNIQUES USED AND CURRENT MANAGEMENT CONTROL	WEIGHTED MEAN	VERBAL INTERPRETATI ON
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	Moderately Agree
TOTAL	Total WM: 2.49	Moderately Agree

Table 14 above shows the assessment of respondents on attainability of course outcomes relative to the familiarization with varied plant operations and processes, operational techniques used and current management control with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of course outcomes relative to the familiarization with varied plant operations and processes, operational techniques used and current management control revealed that item 1, the OJT program resulted in the respondents' familiarization with varied plant operations and processes, with a weighted mean of 2.76 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted in the respondent familiarization with operational techniques used in the workplace, with a weighted mean of 2.88 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent’s familiarization with current management control of technical operation in the workplace as shown by the weighted mean of 1.83 with a verbal interpretation of Moderately Agree. This implied that the assessment of respondents on attainability of course outcomes relative to the familiarization with varied plant operations and processes, operational techniques used and current management control is rated at the total weighted mean of 2.49 or moderately agree which implied that the assessment on the course outcome was moderately attained.

TABLE 15

Assessment of Respondents on Attainability of Course Outcomes relative to the Development of Responsible Attitude and Self-Motivation by Systematically Handling Task in Design and Other Activities Relevant to Industrial Engineering (n=50, ± 2% margin of error, 95% confidence level)

OBE OJT COURSE OUTCOME ATTAINABILITY RELATIVE TO THE DEVELOPMENT OF RESPONSIBLE ATTITUDE AND SELF-MOTIVATION BY SYSTEMATICALLY HANDLING TASK IN DESIGN AND OTHER ACTIVITIES RELEVANT TO INDUSTRIAL ENGINEERING	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted in the respondents' development of responsible attitude in the workplace…	2.89	AGREE
Respondents’ development of self-motivation to work actively and energetically to achieve goals…	2.63	AGREE
Development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to Industrial Engineering…	2.65	AGREE
	Total WM: 2.72	AGREE

Table 15 above shows the assessment of respondents on attainability of course outcomes relative to the development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to industrial engineering with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of course outcomes relative to the development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to industrial engineering revealed that item 1, the OJT program resulted in the respondents' familiarization with varied plant operations and processes, with a weighted mean of 2.89 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted in the respondents’ development of self-motivation to work actively and energetically to achieve goals, with a weighted mean of 2.63 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent’s development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to Industrial Engineering as shown by the weighted mean of 2.65 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of course outcomes relative to the development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to industrial engineering is rated at the total weighted mean of 2.72 or agree which implied that the assessment on the course outcome was generally attained.

TABLE 16

Assessment of Respondents on Attainability of Course Outcomes relative to the Development of Good Human Relations in Industrial Operations (n=50, ± 2% margin of error, 95% confidence level)

OBE OJT COURSE OUTCOME ATTAINABILITY RELATIVE TO THE DEVELOPMENT OF GOOD HUMAN RELATIONS IN INDUSTRIAL OPERATIONS	WEIGHTED MEAN	VERBAL INTERPRETATION
The OJT program resulted in the respondents' personal development of good human relations in a workplace	2.65	AGREE
Demonstrates positive attitude to influence fellow workers inside and outside the company …	2.74	AGREE
Ability to demonstrate a self-initiating habit to influence fellow workers which are essentials in the labor market…	2.68	AGREE
	Total WM: 2.69	AGREE

Table 16 above shows the assessment of respondents on attainability of course outcomes relative to the development of good human relations in industrial operations with a total of fifty (50) respondents at ± 2% margin of error and 95% confidence level. The assessment of respondents on attainability of course outcomes relative to the development of good human relations in industrial operations revealed that item 1, the OJT program resulted in the respondents' personal development of good human relations in a workplace, with a weighted mean of 2.65 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted in the respondent demonstrating a positive attitude to influence fellow workers inside and outside the company, with a weighted mean of 2.74 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to demonstrate a self-initiating habit to influence fellow workers which are essentials in the labor market as shown by the weighted mean of 2.68 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of course outcomes relative to the development of good human relations in industrial operations is rated at the total weighted mean of 2.69 or Agree which implied that the assessment on the course outcome was generally attained.

PART III: Needs Assessment and Gaps analysis in the study

TABLE 17
Assessment on the current labor market demand and the training needs to the Industrial Engineering Graduates who are currently employed in selected manufacturing industries in the National Capital Region.
(n=50)

RANK	Current Labor Market Demands in	Frequency	Percentage
1	A graduate who is with inherent punctuality, preparedness, and self-initiating habit and willing to work overtime if needed.	20	40.00%
2	Knowledgeable in the application of Program Evaluation and Review Technique (PERT method) in the Industrial Engineering Operation.	10	20.00%
3	Knowledgeable in manufacturing optimization technique using the linear programming model to optimize performance and productivity.	8	16.00%
4	Industrial companies are looking for graduates with inherent technical, analytical, and soft skills molded by developing global demands.	7	14.00%
5	A graduate who is proficient both in written and oral technical report writing with specialization in line production manufacturing issues and concern.	5	10.00%
Total= 50 respondents		50	100.00%

Table 17 above shows the survey on current labor market demands in industrial manufacturing firms. On top of the survey is the rank 1 which is “a graduate who is with inherent punctuality, preparedness, and self-initiating habit and willing to work overtime if needed,” with a frequency of twenty (20) that corresponds to the percentage of 40.00%; followed the rank 2 which is “knowledgeable in the application of Program Evaluation and Review Technique (PERT method) in the Industrial Engineering Operation,” with a frequency of ten (10) that is equivalent to 20.00%, respectively. In addition, rank 3 is “knowledgeable in manufacturing optimization technique using the linear programming model to optimize performance and productivity,” with a frequency of eight (8) that is equivalent to 16.00% followed by rank number 4 which is “industrial companies are looking for graduates with inherent technical, analytical, and soft skills molded by developing global demands,” with a frequency of seven (7) that is equivalent to 14.00%. And lastly, rank number 5 is “A graduate who is proficient both in written and oral technical report writing with specialization in line production manufacturing issues and concern,” with a frequency of five (5) that is equivalent to 10.00%.

TABLE 18

Assessment on the current labor market demand and the training needs for entering BSIE graduates prior to job employment (n=50)

RANK	Training needs for entering BSIE graduates prior to job employment	Frequency	Percentage (%)
1	Newly graduate of industrial engineering needs to be trained in Lean Six Sigma prior to entering in the Job Market.	15	30.00%
2	Training on development and formulation of data analytics model 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 a kind of integrated software platform that helps manufacturing firm operations and automate industrial operations across departments .	8	16.00%
5	For effective and safety data security operation IE graduates are needed to attend training on cybersecurity awareness for manufacturing systems.	6	12.00%
Total= 50 respondents			100.00%

Table 18 above shows the assessment on training needs for entering bsie graduates prior to job employment with a total of 50 respondents. On top of the survey is the rank 1, which is "newly graduate of industrial engineering needs to be trained in Lean Six Sigma prior to entering in the Job Market," with a frequency of fifteen (15) that corresponds to the percentage of 30.00%; followed by the rank 2, which is "training on development and formulation of data analytics model using Excel or Power Business Intelligence," with a frequency of twelve (12) that is equivalent to 24.00%, respectively. In addition, rank 3 is "training on industrial automation and Programmable Logic Control applications," with a frequency of nine (9) that is equivalent to 18.00%, followed by rank number 4, which is "enterprise Resource Planning is a kind of integrated software platform that helps manufacturing firm operations and automate industrial operations across departments," with a frequency of eight (8) that is equivalent to 16.00%. And lastly, rank number 5 is "for effective and safety data security operation, IE graduates are needed to attend training on cybersecurity awareness for manufacturing systems," with a frequency of six (6) that is equivalent to 12.00%.

SUMMARY OF FINDINGS

This study entitled "Labor Market Demand 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," employed the three-phase model which covered the PROACTIVE PHASE that includes identifying ongoing issues for OJT program, selection of Industrial Engineering graduates who are currently occupying respective positions in the labor market, identifying selected Industrial Engineering Companies where BSIE graduates are currently employed, collection of relevant research materials, coordinating research activities to BSIE chairperson and industry partners, Initial Interview and coordination with BSIE graduates who are currently employed in selected industrial engineering companies, initial review of relevant OBE OJT collection of research abstract. In addition, the ACTIVE PHASE covered submission of research proposal, coordination of research activities with research collaborators, respondents and industry partners, writing the draft of research abstract, writing the draft of research paper rationale, writing the draft of research objectives, writing the draft of conceptual framework, formulation of survey questionnaire, data analytics, and writing the draft of research methodology. Lastly, the REACTIVE PHASE of this research paper covered the Labor Market Demand of Industrial Companies to the OJT OBE Program in the College of Engineering of Quezon City University and recommendation for the training needs of succeeding Industrial Engineering OJT Students.

SUMMARY, CONCLUSION, AND RECOMMENDATION

Conclusion 1:

Assessment of respondents on attainability of program outcomes relative to the ability to design, develop, implement, and improve integrated systems revealed that item 1, the OJT program resulted to the respondents ability to design and develop integrated systems, with a weighted mean of 1.91 with a verbal interpretation of Moderately Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's ability to implement integrated systems that include people, materials, information, equipment and energy, with a weighted mean of 2.75 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to solve complex engineering problems as shown by the weighted mean of 1.76 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of program outcomes relative to the ability to improve integrated systems that include people, materials, information, equipment and energy is rated at the total weighted mean of 2.82 or Agree which implied that the assessment on the program outcome was attained.

Conclusion 2:

Assessment of respondents on attainability of course outcomes relative to the theories learned in school to the actual technical and/or practical solutions to industrial problems revealed that item 1, the OJT program resulted to the respondents theories learned in school to the actual technical performance in the workplace, with a weighted mean of 2.78 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted to the respondent's ability to apply theories learned in the workplace, with a weighted mean of 2.63 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to apply practical solutions to industrial problems in the workplace as shown by the weighted mean of 2.84 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of course outcomes relative to the theories learned in school to the actual technical and/or practical solutions to industrial problems is rated at the total weighted mean of 2.75 or Agree which implied that the assessment on the course outcome was attained.

Assessment of respondents on attainability of course outcomes relative to the familiarization with varied plant operations and processes, operational techniques used and current management control revealed that item 1, the OJT program resulted in the respondents' familiarization with varied plant operations and processes, with a weighted mean of 2.76 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted in the respondent familiarization with operational techniques used in the workplace, with a weighted mean of 2.88 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's familiarization with current management control of technical operation in the workplace as shown by the weighted mean of 1.83 with a verbal interpretation of Moderately Agree. This implied that the assessment of respondents on attainability of course outcomes relative to the familiarization with varied plant operations and processes, operational techniques used and current management control is rated at the total weighted mean of 2.49 or moderately agree which implied that the assessment on the course outcome was moderately attained.

Assessment of respondents on attainability of course outcomes relative to the development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to industrial engineering, revealed that item 1, the OJT program resulted in the respondents' familiarization with varied plant operations and processes, with a weighted mean of 2.89 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted in the respondents' development of self-motivation to work actively and energetically to achieve goals, with a weighted mean of 2.63 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to Industrial Engineering as shown by the weighted mean of 2.65 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of course outcomes relative to the development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to industrial engineering is rated at the total weighted mean of 2.72 or agree which implied that the assessment on the course outcome was generally attained.

Assessment of respondents on attainability of course outcomes relative to the development of good human relations in industrial operations, revealed that item 1, the OJT program resulted in the respondents' personal development of good human relations in a workplace, with a weighted mean of 2.65 with a verbal interpretation of Agree. In addition, the assessment of item number 2 revealed that the OJT program resulted in the respondent demonstrating a positive attitude to influence fellow workers inside and outside the company, with a weighted mean of 2.74 with a verbal interpretation of agree. Moreover, assessment on item number 3 revealed that the OJT program resulted to the respondent's ability to demonstrate a self-initiating habit to influence fellow workers which are essentials in the labor market as shown by the weighted mean of 2.68 with a verbal interpretation of Agree. This implied that the assessment of respondents on attainability of course outcomes relative to the development of good human relations in industrial operations is rated at the total weighted mean of 2.69 or Agree which implied that the assessment on the course outcome was generally attained.

Conclusion 3

Assessment of respondents on current labor market demands in industrial manufacturing firms revealed that on top of the survey is the rank 1 which is "a graduate who is with inherent punctuality, preparedness, and self-initiating habit and willing to work overtime if needed," with a frequency of twenty (20) that corresponds to the percentage of 40.00%; followed the rank 2 which is "knowledgeable in the application of Program Evaluation and Review Technique (PERT method) in the Industrial Engineering Operation," with a frequency of ten (10) that is equivalent to 20.00%, respectively. In addition, rank 3 is "knowledgeable in manufacturing optimization technique using the linear programming model to optimize performance and productivity," with a frequency of eight (8) that is equivalent to 16.00% followed by rank number 4 which is "industrial companies are looking for graduates with inherent technical, analytical, and soft skills molded by developing global demands," with a frequency of seven (7) that is equivalent to 14.00%. And lastly, rank number 5 is "A graduate who is proficient both in written and oral technical report writing with specialization in line production manufacturing issues and concern," with a frequency of five (5) that is equivalent to 10.00%.

Assessment of respondents on training needs for entering BSIE graduates prior to job employment with a total of 50 respondents revealed that on top of the survey is the rank 1, which is “newly graduated industrial engineers need to be trained in Lean Six Sigma prior to entering the job market,” with a frequency of fifteen (15) that corresponds to the percentage of 30.00%; followed by the rank 2, which is “training on development and formulation of data analytics models using Excel or Power Business Intelligence,” with a frequency of twelve (12) that is equivalent to 24.00%, respectively. In addition, rank 3 is “training on industrial automation and Programmable Logic Control applications,” with a frequency of nine (9) that is equivalent to 18.00%, followed by rank number 4, which is “enterprise Resource Planning is a kind of integrated software platform that helps manufacturing firm operations and automate industrial operations across departments,” with a frequency of eight (8) that is equivalent to 16.00%. And lastly, rank number 5 is “for effective and safe data security operation, IE graduates are needed to attend training on cybersecurity awareness for manufacturing systems,” with a frequency of six (6) that is equivalent to 12.00%.

Recommendations of the Study

Based on the forgoing conclusions, the researchers arrive at the following recommendations:

The OBE on-the-job training program, including the program outcomes, must be calibrated to make it realistic and truly attainable at the end of the OJT training. Specifically, there is a need to eliminate some of the unnecessary clauses, such as " enable to design systems during his OJT," "enable to share his learned knowledge that contributes to the objectives of the team," " enabled to solve complex engineering problems," " enable to analyze specific issues and communicate possible solutions," and " enable to design and develop integrated systems."

The OBE on-the-job training program, including the course outcomes, must be calibrated to make it realistic and truly attainable at the end of the course of the study. During the OJT program, QCU graduates should be able to familiarize themselves with operational techniques used in the workplace. The rest of the clauses in the course outcomes must be maintained such as theories learned in school to the actual technical and/or practical solutions to industrial problems; development of responsible attitude and self-motivation by systematically handling task in design and other activities relevant to Industrial Engineering; and development of good human relations in industrial operations. These clauses must be strengthened and be given priority for innovation.

The next batch of BSIE OJT OBE program students must be given the OJT program orientation that includes (1) a graduate who is with inherent punctuality, preparedness, and self-initiating habit and willing to work overtime if needed; (2) knowledgeable in the application of Program Evaluation and Review Technique (PERT method) in the Industrial Engineering Operation; (3) is knowledgeable in manufacturing optimization technique using the linear programming model to optimize performance and productivity; (4) industrial companies are looking for graduates with inherent technical, analytical, and soft skills molded by developing global demands; (5) a graduate who is proficient both in written and oral technical report writing with specialization in line production manufacturing issues and concern, so that when they graduate they are ready to face the real challenge in the labor market for industrial engineers. The next batch of OBE OJT program must be given a training on (1) Lean Six Sigma prior to entering the job market; (2) training on development and formulation of data analytics models using Excel or Power Business Intelligence; (3) training on industrial automation and Programmable Logic Control applications; (4) training on enterprise Resource Planning is a kind of integrated software platform that helps manufacturing firm operations and automate industrial operations across departments; and (5)Training on cybersecurity awareness for manufacturing systems, so that when they graduate they are ready to face the real challenge in the labor market for industrial engineers.

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