
The Effectiveness of Industrial Training in Developing the Professionalism Among Civil Engineering Students, Polytechnic Sultan Mizan Zainal Abidin

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Abstract

This study explores the effectiveness of industrial training in enhancing the professionalism of civil engineering students. Industrial training plays a vital role in bridging the gap between academic learning and real-world industry practice, particularly in engineering education. In the context of civil engineering, where practical skills and professional conduct are crucial, industrial training serves as a platform for students to develop essential professional qualities such as ethical responsibility, effective communication, teamwork, and leadership. The purpose of this study is to evaluate the effectiveness of industrial training in developing professionalism among civil engineering students in Polytechnic Sultan Mizan Zainal Abidin, Dungun Terengganu. Specifically, it aims to assess the impact of industrial training on student's professional growth, identify the challenges they face during the training period and proposed suggestions for improvement. This study uses a quantitative method through a questionnaire distributed to 73 Civil Engineering Diploma students who completed their industrial training during Session I:2024/2025 and Session II:2024/2025. The finding of the study is categorized into three main aspects: industrial training experience, development of professionalism and challenge during industrial training. For the industrial training experience, the average mean and standard deviation obtain is 4.375 and 0.777 This indicates that respondents strongly agree with positive statement about the training experience, and the relatively low standard deviation suggest consistency in their responses. In terms of professional development also, the average mean and standard deviation is 4.539 and 0.682 where it indicates that the most respondents agreed or strongly agreed with the positive statement about professional development in industrial training. As for challenge during industrial training, the average score mean was 2.349 with a standard deviation of 1.219. While most students reported positive experience, the higher standard deviation indicates variability in responses, suggesting that some students did encounter difficulties. Based on the findings obtains, it shows that the industrial training is effective in developing the professionalism among civil engineering diploma students.

Keywords : *Industrial Training, Professionalism, Civil Engineering Students*

I. INTRODUCTION

Industrial training is an essential component of technical and professional education, particularly within civil engineering programmes. It bridges academic learning with practical industry exposure, offering students valuable experience in real workplace settings and enabling them to apply theoretical knowledge in practical, real-life situations. In a competitive and globalised job market, professionalism, including work ethics,

communication skills, teamwork and social responsibility, plays a vital role in the employability and long-term success of graduates. Industrial training offers considerable potential for developing these professional qualities and preparing students to become versatile civil engineers. By engaging in real-world engineering projects, students gain hands-on experience that strengthens their technical expertise, problem-solving capabilities, and overall professional competence, skills that are critical for their future careers in civil engineering field.

Professionalism in civil engineering goes beyond technical competence; it encompasses ethical considerations, workplace communication, teamwork, and adaptability to industry demands. Employers increasingly seeking graduates who demonstrate not only academic excellence but also the ability to work effectively in a professional environment. Industrial training provides students with an important platform to familiarize themselves with industry standards, and collaborative project management practices.

Industrial training also presents challenges, including placement availability, variation in training quality, and alignment between academic curricula and industry expectations. Some students experience difficulties in transitioning from classroom learning to practical applications, underscoring the need for well-structured training programs with adequate mentorship and evaluation mechanisms.

This research aims to assess the effectiveness of industrial training in developing the professionalism among civil engineering students. The study examines students' perspectives, to determine how training programs contribute to professional development. By analysing key factors such as industrial training experience, development of professionalism and challenges during industrial training.

II. PROBLEM STATEMENT

Civil engineering graduates are expected to demonstrate a high standard of professionalism, encompassing ethical behaviour, effective communication, teamwork, leadership, and adaptability in dynamic work environments. These competencies are crucial for career readiness and long-term success in the industry. Industrial training has long been integrated into engineering curricula as a means of bridging the gap between theoretical knowledge and practical application. It is assumed to be a key vehicle for developing professionalism among engineering students by exposing them to real-life work conditions and industry expectations. However, are placed in roles unrelated to their field, perform repetitive tasks, or lack proper guidance resulting in limited professional growth. This study, therefore, seeks to address this gap by systematically examining the effectiveness of industrial training in developing professionalism among civil engineering students.

Professionalism is a fundamental requirement in civil engineering, encompassing technical expertise, ethical responsibility, teamwork, and communication skills. Employers and industry professionals emphasize the importance of

graduates being well-prepared for employment, combining theoretical knowledge with practical experience. However, many civil engineering encounters difficulties in the transition from university studies to professional world, raising concern about their readiness for the demands of the industry.

Industrial training is designed to bridge this gap by providing students with hands-on experience in real-world projects. While these programs aim to enhance technical competencies and workplace adaptability, the extent to which they effectively shape students' professionalism remains unclear. Some students report significant benefits in terms of skill development and confidence, whereas others struggle with inadequate mentorship, misalignment between academic curricula and industry expectations, and limited exposure to essential professional practices.

Additionally, variations in industrial training quality, placement accessibility, and duration contribute to inconsistent learning outcomes. Without a structured approach to evaluating the effectiveness of these programs, educational institutions and industry stakeholders face difficulties in refining training methodologies to maximize students' professional growth. This study seeks to evaluate the effectiveness of industrial training in developing the professionalism among civil engineering students by examining their experiences, industry perspectives, and training frameworks. The research aims to identify key factors influencing professional development, explore challenges faced during training, and propose improvements to enhance future training programs.

III. LITERATURE REVIEW

Industrial training (also referred to as internship or practicum) is a form of **experiential learning** that enables students to gain practical insights into real-world working environments. Industrial training is structured learning off campus learning program that offers students the opportunity to gain practical experience in a professional environment before entering the workplace [1].

Internships and cooperative education experiences are regarded as "high impact practices in higher education". From the industry's viewpoint, internships are highly valued, with research demonstrating that employers prefer candidates who have completed work-based internships or placement when selecting talent during recruitment [2]. Internships offer engineering students valuable opportunities to acquire a broad range of knowledge

and skills. However, workplace learning is naturally less structured and more unpredictable than traditional classroom-based education [3].

The emergence of artificial intelligence in the workplace, along with intense competition workforce, has prompted significant concerns regarding the future of work and the capacity of undergraduate academic programs to adequately prepare students for this rapidly evolving and demanding environment [4].

Although the benefits of internships particularly the development of technical and soft skills are widely acknowledged, higher education institutions should actively manage and enhance the effectiveness of their internship programs to ensure positive learning outcomes for interns. For such a purpose, it is imperative to evaluate the quality of engineering internships in order to identify opportunities for enhancing their design and implementation [5].

Civil engineering education at universities must continuously evolve to ensure are well-prepared for a dynamic and ever-changing industry. Employers increasingly need diverse skills, including the skills that graduates will need in a few years' time that cannot even be conceived yet [6].

The internship program provides students with the opportunity to understand how theoretical concepts are applied in real-world situations. Since industries tend to favor hiring graduates with practical training experience, internship program helps students secure employment more quickly. Most of the academic institutions, giving a due recognition to the internship programmes, are now tends to incorporate an internship component to their academic curricular [7].

It is a common belief in the Malaysian construction industry that training is essential if the performance improvement of the construction workforce is to be achieved. This emanates from the conviction that training lies at the core of creating, maintaining, and developing the construction workforce, who contribute significantly to the achievement of construction projects [8].

The significance of employability skills in the engineering sector is more critical now than ever before. Most engineering industries utilise advanced equipment, complex system, and systematic processes, demanding engineers who are highly trained, versatile, and multi-skilled. Employers need an engineer with a solid theoretical background and equipped with essential soft skills and employability skills [9].

Educational goals proposed at the end of the 20th century such as "returning to engineering practice,"

"embracing the shift in the engineering education paradigm," and "reengineering engineering education" reflected an increasing international trend toward innovative engineering education. In the context of school enterprise collaboration, it is essential to provide on-site practical opportunities for students, allowing them to spend approximately a year learning within an enterprise environment. Such programs should include companies assigning experienced engineers as instructors and facilitating student involvement in operations, technological innovation and engineering development [10].

Industrial training offers a wide range of benefits, with the most significant being its ability to provide students with the opportunity to apply their academic knowledge and skills in real-world work environments. Moreover, it also provides chances for students to learn from practitioners in their respective fields [11].

In civil engineering, industrial training allows students to engage with tasks related to construction, structural design, site supervision, project management, and workplace safety—bridging the gap between classroom theory and industry practice. Professionalism in engineering encompasses a broad range of competencies, including Work ethics (discipline, integrity, accountability), Communication skills (oral, written, technical reporting), Teamwork and collaboration, Leadership and time management, Critical thinking and problem-solving. The industrial training programme refers to exposure to real working environment that contributes to students' professional development prior to graduation and supports their future employability. It is an essential element in the development process of professional skills and work ethics required to become an engineer [12].

As Malaysia moves towards becoming a developed country, graduates are expected have excellent academic achievement and skills before entering an increasing challenging real working world. A curriculum structure which integrates knowledge, work experience, human skill, and technical skill is needed to ensure that universities produce graduates with excellent qualification [13].

Furthermore, [14] emphasize that industrial training enables students to understand professional expectations, communication protocols, and teamwork dynamics in engineering organizations. Their study found that students who participated in well-structured training programs demonstrated higher confidence levels and better adaptability to workplace challenges compared to those who relied solely on classroom education.

Engineers who have recently entered the industry are often not adequately prepared for the workforce due to lack of essential non-technical skills. One of the contributing factors is the limited industry exposure they receive during their industrial training as undergraduates [15]. The integration of soft skills and employability skills into the curriculum of every field of study is crucial for enhancing the quality of graduates in educational institutions. One effective approach to achieving this is through industrial training or industrial attachment programs [16]. Industrial training must be well-organized to ensure that engineering students acquire optimal professional skills and practical experience that can be effectively applied in the workplace upon graduation. Industrial training aims to develop the skills required by the industry and plays a crucial role in producing a skilled and professional workforce for the future [17].

According to the Board of Engineers Malaysia (BEM), today's engineers are increasingly assessed not only for technical expertise but also for their ability to function professionally within multidisciplinary teams and high-pressure environments.

However, the effectiveness of training is highly dependent on several factors, including Quality of supervision provided by industry mentors, Duration and relevance of tasks assigned, Degree of alignment between training activities and academic coursework, Level of support and monitoring provided by educational institutions. Common issues reported in previous studies include Placement of students in companies unrelated to their field of study, Insufficient mentoring and feedback from industry supervisors, short training duration that limits skill development opportunities. This study builds upon existing literature and seeks to examine the issue within a local context, specifically focusing on civil engineering students in Polytechnic Sultan Mizan Zainal Abidin.

IV. RESEARCH METHODOLOGY

A. Research Design

This study used a descriptive quantitative approach, utilizing a questionnaire as the primary tool for data collection. The questionnaire was distributed to respondents through google form to ensure accessibility and convenience. It is divided into FOUR sections: Respondent Demographic, Industrial Training Experience, Development of Professionalism and Challenge During Industrial Training.

B. Research Sample

The sample involved in this study is Civil Engineering students who have completed industrial training. The students sample consists of two industrial training sessions, namely Session I:2024/2025, Session II:2024/2025.

C. Data Analysis

The study items were measured using scores based on the Likert Scale. The data was analysed using Statistical Package for Social Science (SPSS) version 27.0 to calculate the mean score and standard deviation. These values were used to interpret the effectiveness of industrial training in developing the professionalism among civil engineering students, Polytechnic Sultan Mizan Zainal Abidin.

Table 1: Score Mean Interpretation

Score Mean	Interpretation
1.00 – 2.33	Low
2.34 – 3.66	Moderate
3.67 – 5.00	High

V. RESEARCH FINDINGS AND DISCUSSION

A. Respondent Demography

Table 2: Respondent Demography

Item	Sub-Item	Frequency (f)	Percentage (%)
Gender	Male	41	56
	Female	32	44
Organization	Government	16	22
	Private	46	63
	Construction Firm		
	Consultancy Firm	11	15

B. Effectiveness of Industrial Training in Developing Professionalism Among Civil Engineering Students

Table 3 : Industrial Training Experience

Bil	Item	Mean	Sd
1	The tasks assigned were related to civil engineering	4.342	0.869
2	Always given meaningful responsibilities during training	4.315	0.779
3	Supervisor provided sufficient guidance	4.369	0.772
4	Always exposed to real work situations in civil engineering projects	4.397	0.777

5	Training duration was adequate for gaining experience	4.452	0.688
Average		4.375	0.777

Table 3 above shows the item of industrial training experience. The first item assesses the task assigned were related to civil engineering where the mean obtained is 4.342 and 0.869 standard deviation. It means that the tasks they did were relevant to their field, indicating good alignment with academic knowledge. Second item is about the responsibilities during training where the mean and standard deviation obtain is 4.315 and 0.779. It indicates the respondents felt they were frequently assigned meaningful work, which is important for engagement and learning. The third item is supervisor provided the sufficient guidance where the mean obtain is 4.369 with 0.772 standard deviation. It indicates the strong agreement among respondents that supervisors gave enough guidance. For the fourth item, industrial training always exposed to real work situations in civil engineering projects, the mean and standard deviation value is 4.397 and 0.777 where it indicates the respondents experienced hands-on, practical work, a key factor in training relevance. The last item assess is training duration where the mean and standard deviation is 4.452 and 0.688. It indicates that the respondent felt the training duration was sufficient to gain the necessary skills and experience. For overall average mean value, it indicates that the respondents strongly agree with positive statement about the training experience while average standard deviation also indicates that the good consistency in responses across all this item.

Table 4 : Development of Professionalism

Bil	Item	Mean	Sd
1	Can improved time management during industrial training	4.547	0.601
2	Can learned to communicate effectively with team members and clients	4.534	0.668
3	Can developed a better understanding of workplace ethics and discipline	4.602	0.639
4	Can learned to work collaboratively in teams	4.561	0.686
5	Training experience made more confident to work as a professional engineer	4.452	0.817
Average		4.539	0.682

Table 4 above shows the result of the development of professionalism to respondents. According to the results, first item is assessed the improvement of time management during industrial training where

the mean score was 4.547 with a standard deviation of 0.601. This shows that most respondent felt that their time management has improved. The second item assessed effective communication with team members and clients where the mean was 4.534 and the standard deviation was 0.668. This shows that effective communication is a clear result. The third item developed a better understanding of workplace ethics and discipline in the workplace where the mean score was 4.602 with a standard deviation of 0.639. This data shows that students have better understanding of workplace ethnicity and discipline. For the fourth item which was learned to work collaboratively in a team, the mean value obtained was 4.561 with a standard deviation of 0.686. This shows that teamwork skills among civil engineering students have increased significantly. The fifth item assesses the training experience make more confident to work as a professional engineer where the mean and standard deviation obtained are 4.452 and 0.817. This shows that the training can increase the confidence of civil engineering student to work as a professional engineer. Overall, for this item shows a mean value above 4.40 which shows that most respondents agreed or strongly agreed with the positive statement about professional development in industrial training.

C. Challenges Faced During Industrial Training

Table 5 : Challenges During Industrial Training

Bil	Item	Mean	Sd
1	Tasks not aligned with academic background	2.534	1.225
2	Not receive enough supervision during training	2.301	1.265
3	Not given opportunities to participate in meaningful work	2.219	1.181
4	Not enough training period to gain sufficient experience	2.342	1.204
Average		2.349	1.219

The above Table 5 shows the item of challenges during industrial training. The first item assessed was tasks that were not aligned with the academic background where the mean value is 2.534 with a standard deviation of 1.225 which indicates that the tasks were generally aligned with civil engineering background. For the second challenge is student did not receive sufficient supervision during training where the mean was 2.301 with a standard deviation of 1.265 which means that most respondent did not receive sufficient supervision. For third item, not being given the opportunity to participate in meaningful work, the mean obtained was 2.219 with a standard deviation of 1.181. This means that many respondents felt involved in meaningful work. For item the training period was insufficient, the mean obtain was 2.342 with a standard deviation of 1.204 which means that the training duration was generally

sufficient for civil engineering student. Overall, the average mean value showed that the respondents generally disagreed or were neutral toward the negative statement.

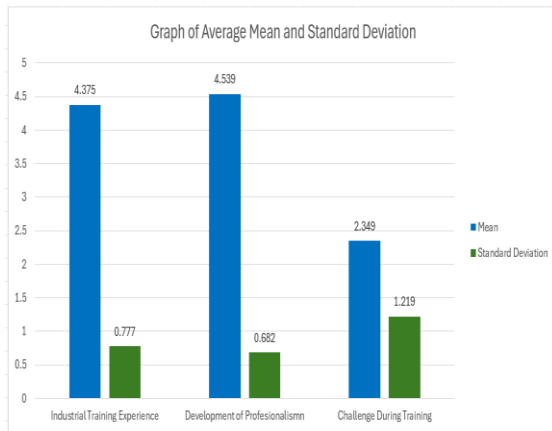


Figure 1: Graph of Average Mean and Standard Deviation

Figure 1 above shows the average mean and standard deviation graph for the effectiveness of industrial training among civil engineering students. For the items industrial training experience and professionalism development, the average mean value shows that the respondents strongly agree with positive while the average standard deviation shows good consistency in responses across all this item. For the item challenge during training, the average mean is 2.349 and 1.219 standard deviation which means that the respondents generally disagreed or were neutral toward the negative statement.

VI. CONCLUSION

This study examined the effectiveness of industrial training in developing the professionalism among civil engineering students in terms of industrial training experience, development of professionalism and challenge during industrial training. The findings affirm that the industrial training provides positive experience for civil engineering student in terms of task assigned, students always given meaningful responsibilities during training, supervisor provided sufficient guidance, always exposed to real work situation in civil engineering and adequate training duration for gaining experience. For development of professionalism also, most respondents agreed or strongly agreed with the positive statement about professional development in industrial training. For the challenges during industrial training, most respondents felt their training experience was positive. A value of standard deviation indicates that although most of respondents agree, there is some variation where that there are also some individuals who may face this challenge. The data obtained also indirectly shows that the selection of an industrial



training place is important so that students gain industrial training experience according to their field of study. For the challenge during industrial training, the data shows that some respondents may face this challenge. Therefore, to overcome this issue such as not being aligned with academic background, students need to choose a right place for industrial training. Institutions also need to ensure that students choose the right and appropriate industrial training place according to field so that students get the appropriate experience in the field of civil engineering.

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