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Transforming Industrial Engineering Education: Introducing the CWILE Model for Work-Integrated Learning in the Digital Age

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Abstract: Thailand's industrial sector has made significant progress in adopting and implementing technology associated with Industry 4.0. As technology advances and industries become more digitally driven, a skilled and adaptable workforce becomes paramount. The responsibility for cultivating such human resources lies with educational institutions. They are the foundation for developing a workforce that can thrive in the digital age by staying responsive to industry trends, fostering business collaboration, and prioritising technical and soft skills. Work-integrated learning (WIL) is one of the educational programs that can help improve student skills by integrating the theoretical exploration of a particular subject with its practical implementation within a professional environment. The WIL program enables individuals to demonstrate competence, expertise, and the capacity to keep up with contemporary technologies. This paper proposes the new WIL model for the WIL program in the industrial engineering profession, known as the CWILE model. The study aims to identify and establish the benefits of the CWILE model. These benefits include enhanced skill development, improved readiness for industry demands, and a seamless transition from education to the workforce. The initial step in the research procedure involved collecting stakeholders' perspectives on the existing WIL program in the industrial engineering department of the engineering faculty at Rajamangala University of Technology Lanna (RMUTL), Thailand. Following stakeholder feedback, the CWILE model was developed and implemented with the participation of eighteen students in the WIL program. The effectiveness of the CWILE model was assessed through a comprehensive evaluation of student competencies: core competency, functional competency, and professional competency. The evaluations were conducted at three distinct intervals: before, during, and after instruction. This longitudinal assessment allows a nuanced understanding of how the WIL program influences student competencies. The results of this study show that the duration of attending the WIL program is positively correlated with an increase in all competencies.

Keywords: Work-integrated learning, industrial engineering, teaching and learning process, IR4.0, TVET

1. Introduction

The national education management policy of the Thai government is to increase educational opportunities and equality for Thai people (Education, 2017). Educational institutes and authorities must produce high-performing graduates who are experts in the specific field and ready for the industry's requirements. Moreover, educational institutes should produce and develop capable manpower to support the country's development by cooperating with the private sector to promote

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educational management, bilateral education, and work-integrated learning (WIL) to obtain the required competency. Chinintron and Plaimart (2010) describe WIL as an educational strategy for preparing students who can apply theoretical concepts to practice-based tasks, ultimately enhancing graduate employability. In the WIL program, learners should be able to practice critical thinking and skills according to the required standards and knowledge and potential based on the professional standards corresponding to the country's demands (Cooper et al., 2010).

Educational institutes in Thailand arrange education to respond to government policy and WIL constantly. For example, Poungkaew and Puthaprasert's (2020) research investigated a work-integrated learning model to prepare educational administrators for Thailand. Moreover, Chaithanu et al. (2019) conducted a study on the development of an instructional model based on Work-Integrated Learning (WIL) for the new generation of graduates: A case study of Fujikura Electronics (Thailand) Ltd. in the Department of Electronic Engineering and Automatic Control Systems by developing the appropriate teaching and learning for the automatic control curriculum. This research presents the work-integrated learning model for the industrial engineering program at the Faculty of Engineering, Rajamangala University of Technology (RMUTL), Thailand. This program has incorporated the learning process with the establishments to produce high-performing graduates. This research aims to develop the WIL model in three stages: 1) Exploring the needs of stakeholders, 2) Developing the WIL model, and 3) Implementing the developed WIL model.

1.1 The Work Integrated Learning (WIL)

Research papers are widely dispersed and aim to enhance work-integrated learning methods in engineering education. The authors' WIL strategy entails integrating WIL into each semester of a Bachelor of Engineering program (Dollinger & Brown, 2019; Jovanovic et al., 2018). WIL is expected to yield advantages for institutes through the facilitation of heightened student engagement and industry collaboration, an enhanced curriculum featuring augmented WIL components and improved quality of student education (Smith & Worsfold, 2014), amplified student enrolment (Sattler et al., 2011), increased student satisfaction (Chopra et al., 2020; Smith & Worsfold, 2014), active involvement of government in the consultation process, and enhanced community engagement (Yorke & Vidovich, 2014) (Karim et al., 2019). The WIL program has the potential to be directly employed by curriculum developers to establish the prerequisites for engineering undergraduate programs in Thai universities. It might also be adopted internationally depending on national, state, and university engineering education restrictions (Paull et al., 2019; Vailasseri et al., 2021).

WIL is a scenario where students participate in learning activities outside their academic institution, such as at a workplace or a facility created in partnership with a third party. This aims to guarantee the growth of students' capacity to integrate learning through academic and employment-related activities (Ferns et al., 2014). Developing efficient WIL arrangements has been difficult for engineering higher education in Thailand and worldwide. Numerous studies have shown insufficient opportunities for engineering students to become industry-ready because the WIL duration in Bachelor of Engineering programs is now very short. There is a critical need to give WIL greater weight through a more successful work-integrated strategy to boost the quality of engineering education outcomes (Rampersad & Zivotic-Kukolj, 2018; Stirling et al., 2016).

To improve the employability prospects of their engineering graduates, Thai institutions have used a variety of WIL methodologies. Table 1 displays the curriculum of the WIL programs implemented in Thai universities. Engineering students enrolled at various universities have access to WIL opportunities. However, the current WIL program is only accessible for a restricted duration, specifically during the last semesters of undergraduate engineering study. The duration may be insufficient to acquire all the requisite experience in the workplace. According to this concern, the WIL model could be restructured. We conducted surveys and expert interviews to gather input based on our hypothesis that embedding a full-time WIL program in the workplace is a more successful strategy for producing graduate engineers who are prepared for the industry. Therefore, the CWILE model is proposed.

Recent academic articles provide nuanced perspectives and insights regarding WIL and its application in engineering education. Nguyen et al. (2022) explore the impact of extended WIL durations on engineering students' preparedness for industry demands. Their findings suggest that extended exposure positively influences student competency and enhances their readiness for the workforce, supporting the hypothesis that a more prolonged WIL duration contributes to a comprehensive skill set. Moreover, Smith and Chen (2021) highlighted the crucial role of government initiatives in fostering effective WIL programs. Their research indicates that active government involvement significantly contributes to the success of WIL initiatives, emphasising the importance of collaborative efforts involving educational institutions, industry stakeholders, and policymakers in developing and implementing WIL programs.

In the context of industry-academic collaboration, Li and Jones (2023) investigate the effectiveness of industry partnerships in shaping WIL experiences. Their study underscores the need for robust connections between educational institutions and industry players to ensure that WIL programs align with contemporary industry trends and demands. This aligns seamlessly with the proposed CWILE model, which aims to strengthen collaboration between the industrial engineering program at Rajamangala University of Technology Lanna and private sector stakeholders. Furthermore, Gupta and Sharma (2022) delve into the impact of a WIL program on student satisfaction and engagement. Their research highlights a positive correlation between well-structured WIL programs and heightened student satisfaction, emphasising the critical role of program design in achieving positive educational outcomes. These recent articles collectively contribute to the literature, reinforcing the significance of WIL in engineering education and providing valuable insights for developing and assessing the CWILE model.

This research aims to develop the WIL model for industrial engineering. The specific objectives are 1) to study the stakeholders' needs for the WIL program in industrial engineering, 2) to develop the CWILE model, and 3) to implement the CWILE model for the WIL program in industrial engineering.

Table 1 -WIL curriculum at Thai universities

University	WIL Curriculum
Rajabhat Maha Sarakham University	• Bachelor of Engineering (Energy and Environmental Engineering • Bachelor of Engineering (Water Resources Engineering and Information Innovation) • Bachelor of Engineering (Construction Management Engineering)
King Mongkut's University of Technology North Bangkok	• Bachelor of Engineering (Chemical Process Engineering Technology Program) • Bachelor of Engineering (Chemical Engineering) • Bachelor of Engineering (Industrial Engineering Technology and Logistics Program) • Bachelor of Industry (Mechatronics Technology)
King Mongkut's University of Technology Thonburi	• Bachelor of Engineering (Mechanical Engineering) • Bachelor of Engineering (Food Engineering)
Kasem Bundit University	• Bachelor of Engineering (Industrial Engineering)
Rajamangala University of Technology Isan	• Bachelor of Engineering (Operations Engineering)
Rajamangala University of Technology Thanyaburi	• Bachelor of Engineering (Mechatronics Engineering)
Rajamangala University of Technology Lanna	• Bachelor of Agricultural and Biological Engineering (Modern Agricultural Machinery Engineering) • Bachelor of Agricultural and Biological Engineering (Smart Agricultural Engineering) • Bachelor of Agricultural and Biological Engineering (Agricultural Engineering) • Bachelor of Engineering (Electronics Engineering and Automatic Control Systems) • Bachelor of Engineering (Industrial Engineering)

2. Methods

The method in this paper starts with the first stage of gathering the viewpoints of stakeholders regarding the current work-integrated learning (WIL) program in the industrial engineering department of the engineering faculty at RMUTL. Based on input from stakeholders, the CWILE model was formulated and executed with the eighteen students enrolled in the WIL program. The efficacy of the CWILE approach was then evaluated by conducting a thorough assessment of student competencies, including core competency, functional competency, and professional competency. The assessments were carried out at three discrete time points: pre-instruction, mid-instruction, and post-instruction. The detailed information is explained in the subsequent sections.

2.1 Exploring the Needs of Stakeholders

WIL programs involve collaboration between educational institutions and industry partners to provide students real-world experience related to their field of study. Two steps of study are used to understand the needs of stakeholders in the WIL program. The first step is to survey the opinions on the general factors of the existing WIL program. The second step is to systematically survey and address the competency requirements for industrial engineers from stakeholder perspectives. The explanations are as follows:

Step 1: Survey the opinions on the general factors of the existing WIL program. Those factors are related to the WIL program in the student, teacher, factory trainer, curriculum, teaching management, establishment, and university aspects. A sample of 50 teachers and students who participated in the WIL program of the RMUTL industrial engineering program was utilised. The questionnaire was designed to achieve specific objectives, and it was verified by nine experts using content validity and the Index of Content Validity (IOC). The reliability of the designed questionnaire is tested using the coefficient of Cronbach's alpha (Ravinder & Saraswathi, 2020) and tried out with 10 samples.

Step 2: Survey the needs of stakeholders for producing the desired graduates in industrial engineering in terms of attitudes, generic skills, and professional knowledge and skills. The key stakeholders involved in the Industrial Engineering program include faculty, students, alumni, industry professionals, and employers, 100 in total. A non-structured interview that addresses each stakeholder group's specific needs, expectations, and preferences is used.

2.2 Developing the CWILE Model

This stage presents the creation and validation of the new WIL model, called CWILE. There are six steps of development. The explanation is as follows:

Step 1: The information received from the first stage was analysed to determine the important factors for the new WIL model.

Step 2: Develop the CWILE model based on the obtained notion to enhance the required competency for industrial engineering.

Step 3: Create the CWILE model manual for the user to comprehend the components and specifics of the WIL model implemented in industrial engineering. The proposed manuals are: 1) The curriculum development manual 2) the WIL manual, and 3) the evaluation manual.

Step 4: Verify the quality of the WIL model developed by nine experts to determine its suitability for the WIL program.

Step 5: Modify the proposed model and documents to acquire readiness for implementation.

2.3 Implementing the Developed CWILE Model

The CWILE model is implemented with the 18 students who participated in the WIL program in industrial engineering, which has academic collaboration between RMUTL and the establishments. The evaluation is then provided by considering the possibility of teaching and learning management for the sample class. The following are the evaluation steps:

Step 1: Evaluate the students in terms of the three competencies needed for industrial engineering: core competency, functional competency, and professional competency. The evaluations are at three distinct intervals: before, during, and after instruction.

Step 2: Evaluate the learning achievement of students. Regularly assess whether students meet the intended learning outcomes of industrial engineering. This involves aligning assessments with the specific learning objectives of the CWILE model.

Step 3: Determine the satisfaction of stakeholders with the CWILE model.

3. Results and Discussion

The results of each stage are explained in this section.

3.1 The Results of Stage 1: Exploring the Needs of Stakeholders

In this stage, the survey results are analysed using a rating scale, which involves interpreting quantitative data gathered through responses to specific questions. Standard scale include Likert scales from 1 to 5, where respondents rate statements on a spectrum of "Strongly Disagree", "Disagree", "Neutral", "Agree", and "Strongly Agree".

The survey results of Step 1: Survey the opinions on the general factors of the existing WIL program are illustrated in Fig. 1. The strengths of the current WIL program in terms of student aspects are responsibility, discipline, and self-adjustment. In terms of mentors and teachers, they had high expertise in the profession. The industrial engineering curriculum fulfilled the students' needs. For the instructional administration, the students received adequate supervision. Furthermore, the establishment was aligned with the field of industrial engineering. The university and the establishment provide enough learning sources for the WIL program students.

However, the results of the analysis show some weaknesses that need improvement. Firstly, students who participated in the WIL program required more attention in class because they were exhausted from the training in the workplace. Secondly, teachers and mentors must integrate workplace content into the teaching class. The study plan and duration of the study were at inappropriate intervals. In addition, the administrators responsible for the establishment must understand the WIL program. In the university, some policies needed to be more suitable for operating the WIL program conveniently.

In Step 2: Survey the stakeholders' needs for the desired graduates in industrial engineering in terms of attitudes, generic skills, and professional knowledge and skills; the results show that the respondents want a graduate with a positive attitude towards the profession. The required needs are discipline and responsibility, humility, honesty, awareness, and compliance with social regulations. For the generic skills, the respondents need to develop generic skills in working, appropriate use of tools and equipment, teamwork skills, the capability of using technology for data retrieval, communication in Thai and English, problem analysis, and integration of sciences for work procedure development.

Regarding professional competencies and proficiencies, the following are mandatory: expertise in industrial management, die casting, plastic injection moulding, automation, and painting processes. Details are shown in Table 2.

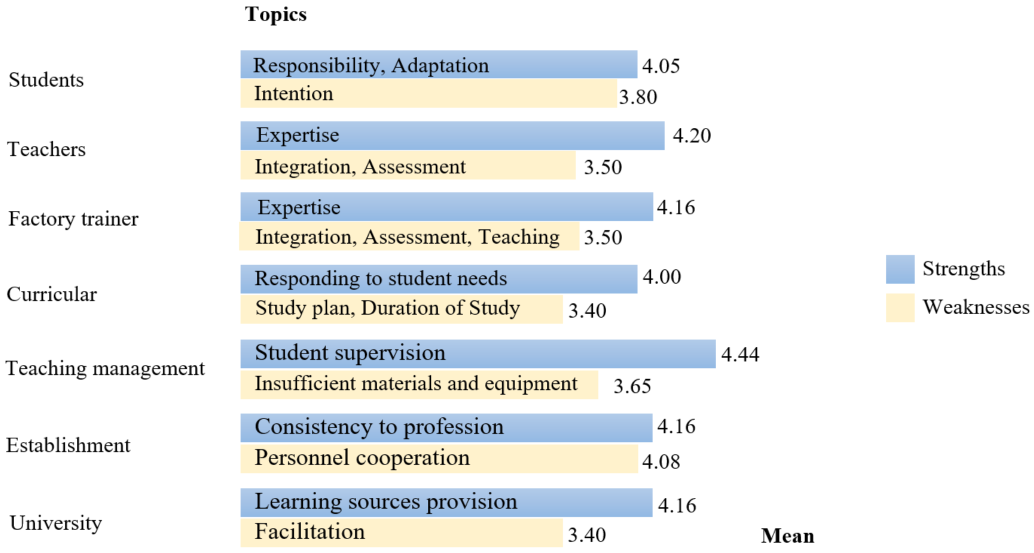

Fig. 1 - Opinions of the sample group on WIL

Table 2 - Stakeholder needs

Item	Topics	M	SD	Interpretation
	Attitudes			
1	Disciplined and have work responsibility	4.85	0.48	Strongly Agree
2	Humble and have collective responsibility	4.75	0.54	Strongly Agree
3	Honest and patient	4.70	0.56	Strongly Agree
4	Have awareness and comply with code of conduct	4.70	0.62	Strongly Agree
5	Comply with organizational and social regulations	4.69	0.58	Strongly Agree
	Total	4.74	0.56	Strongly Agree
	Generic Skills			
6	Have teamwork skills	4.68	0.63	Strongly Agree
7	Be capable of using technology for data retrieving and communication	4.53	0.70	Strongly Agree
8	Think, analyse, resolve problems, and decide based on rationale	4.40	0.73	Agree
9	Have work operational skills and use tools and equipment appropriately	4.70	0.56	Strongly Agree
10	Have integration skills to develop work procedure	4.36	0.78	Agree
	Total	4.53	0.70	Strongly Agree
	Professional knowledge and skills			
11	Injection	4.47	0.68	Agree
12	Die-casting	4.55	0.67	Strongly Agree
13	Automation	4.75	0.43	Strongly Agree
14	Painting	4.20	0.81	Agree
15	Industrial managerial	3.95	0.97	Agree
	Total	4.38	0.79	Agree

3.2 The Results of Stage 2: Developing the CWILE Model

In this section, the construction of the CWILE model is provided. The survey data gathered during the preliminary stage guides the development; the following few subsections explain model development.

3.2.1 The CWILE Model

several key components to ensure its effectiveness in designing or implementing the WIL program. This study considers four key components: principles, content, the teaching and learning process, and measurement and evaluation. Those key components are included in the proposed model, which is separated into four main steps, including Curriculum development (C), Work-Integrated Learning plan (WI), Learning process (L), and Evaluation (E), so-called CWILE as shown in Fig. 2. Details of each step are as follows:

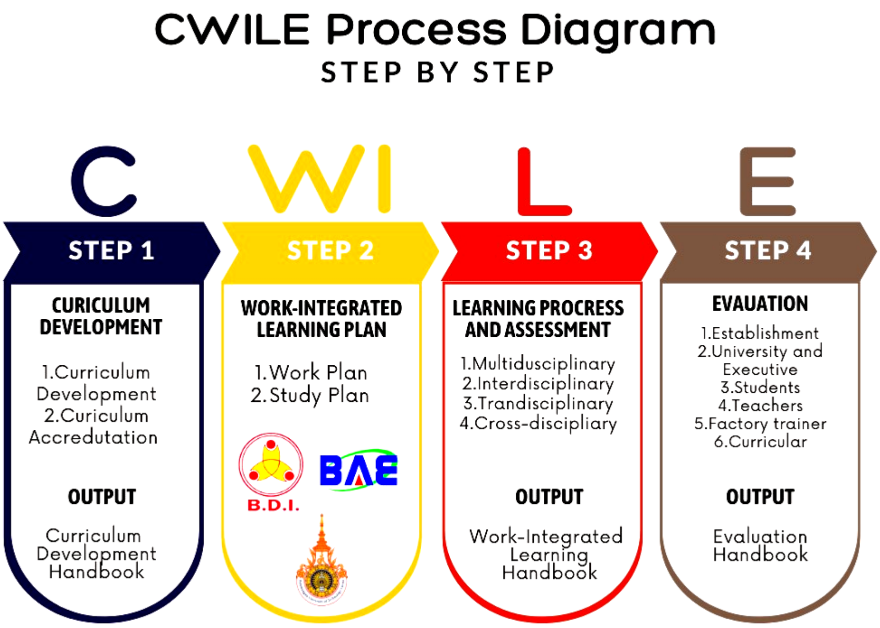

Fig. 2 - CWILE model

Step 1: Curriculum Development (C): The step to develop or improve the curriculum to achieve the required competencies. It consisted of the following four sub-steps:

- Curriculum determination analysis: To analyse the fundamental data relating to the current curriculum. After that, develop the curriculum to suit stakeholders' needs.
- Design of curriculum outcomes: Curriculum outcomes refer to the specific knowledge, skills, abilities, and attitudes students are expected to acquire due to their participation in the WIL program. These outcomes serve as the foundation for designing, delivering, and assessing the effectiveness of the curriculum.
- Developing curriculum documents is a critical step in the instructional design process. The curriculum documents provide a roadmap for educators, ensuring alignment between educational goals, instructional strategies, and assessment methods.
- Curriculum validation: Curriculum validation is reviewing and assessing the curriculum's effectiveness, relevance, and alignment with its intended goals and objectives. The goal is to ensure that the curriculum prepares students adequately for their intended careers and meets the standards set by educational institutions and industry stakeholders.

Step 2: Work-Integrated Learning Plan (WI): This is a step to prepare the WIL program that emphasises all participation by considering the learning achievements identified in the curriculum as a core and arranging the integrated learning between the academic and work parts. The subsequent subsection contains the guidelines for each participant in the WIL program.

- Guidelines for the university: Comprising of educational support provisions, such as the explicit promotion policy, the selection of the integration model, the budget, roles and responsibilities, the obligation of the education manager, learning source preparation, learning achievement, and expected competency determination, learning outcome measurement, and the readiness of the establishment.
- Guidelines for Curriculum: These guidelines are for the instructor who is responsible for the curriculum, which consists of instruction for lesson planning, learning model and venue, course arrangement of fundamental courses and specific courses to suit professional standards, competency evaluation, and work preparedness evaluation based on learning outcomes.
- Guidelines for teachers and mentors: The duties and responsibilities of teachers and mentors actively engaged in the program are indicated. These duties require supervision, coaching skills, and measurement and evaluation techniques.
- Guidelines for students: The preparation for students and their families to understand the WIL program is provided to clearly articulate the benefits and anticipated outcomes of participating in the WIL program. Highlight how the experience aligns with academic and career goals and enhances employability. Moreover, the

student's responsibilities during the WIL program are clearly stated. This includes expectations for professional behaviour, communication with supervisors, and adherence to workplace policies.
- Guidelines for learning resources: These encompass materials and tools that support and enhance the educational program by the university and the workplace.

Step 3: Learning process (L): It is a step to arrange the learning process appropriate for learning and training in the workplace.
- Academic part: University subjects can be taught in the workplace. The class schedule can be flexible while ensuring total study time meets the required hours specified in the syllabus.
- Training part: In the workplace, students should be assigned tasks corresponding to their skill level. Also, the students should be able to learn in various departments within the establishment. It helps students connect theoretical knowledge with practical applications across various functions.
- Integrate part: the integrated part typically refers to connecting and synthesising the theoretical knowledge gained in academic coursework with the practical experiences gained during the work placement. This can be offered in the student senior project. Design the senior project to require problem-solving and critical-thinking skills. Ensure that the senior project aligns with industry standards and practices. This helps students understand and adapt to the expectations of their chosen field.

Step 4: Evaluation (E): Evaluation in the WIL program assesses the program's effectiveness, measures student performance, and provides valuable feedback for continuous improvement.
- Student behaviour evaluation: Collect regular feedback from workplace supervisors who interact with students during their placements. This feedback can provide insights into students' performance, work ethic, and the application of theoretical knowledge.
- Student competency evaluation: the comprehensive set of components for evaluating student competency in the WIL program setting, including core competency, functional competency, and professional competency.
- WIL program evaluation: Establish specific criteria for evaluating the success of the WIL program. This may include academic achievement, skill development, workplace performance, and integrating theoretical knowledge with practical experience. The evaluation results are used to inform continuous improvement efforts. Consider feedback from all stakeholders, including students, supervisors, and faculty, to enhance the overall WIL program.

3.2.2 The CWILE Model Documentation

The CWILE model documentation provides the specific details and requirements for the institution or program. WIL programs can vary significantly between educational institutions, countries, and industries. However, for the CWILE model, it is implemented in industrial engineering. Therefore, the documents might be suitable for the relevant program. The proposed CWILE documents are:
- The curriculum development handbook: This handbook serves as a comprehensive guide for educators and instructional designers involved in creating, revising, or updating educational curricula.
- The Work-integrated Learning (WIL) Program handbook guides students, faculty, and industry partners through the WIL program's processes, expectations, and goals.
- The WIL evaluation handbook provides the necessary parts of evaluation and the evaluation process.

3.2.3 The Quality of the Developed WIL Model

Nine experts verified the WIL model components' quality based on the WIL model creation principle. Results indicated that the developed WIL model and WIL documents had a high level of appropriateness. Moreover, the feasibility of implementation indicated that instructional management was feasible and practical.

Fig. 3 - Developed CWILE handbook

3.3 The Results of Stage 3: Implementing the Developed CWILE Model

3.3.1 Evaluate the Students in Terms of the Three Competencies

The Competency Learning Benchmark (CBL) was applied to evaluate the student's competencies (Chinintron & Plaimart, 2010). The university and the establishment collectively designed the evaluation criteria. The evaluation is divided into three dimensions. The first dimension is the core competency, the organisation's desired competency. The second dimension is functional competency, which is competency in the responsible job. The last dimension is the professional competency, which is the competency showing proficiency. The evaluations are at three distinct intervals: before attending the WIL program, during attending the WIL program, and after attending the WIL program. The educator and factory trainer serve as evaluators.

The results of the prior stage illustrate that the students have low core, functional, and professional competency at the mean of 1.62, 1.30, and 1.14, respectively. After implementing the CWILE model, the students were enhanced to develop their skills; thus, their competencies increased remarkably at a mean of 2.78, 2.60, and 2.57, respectively, as shown in Fig 4.

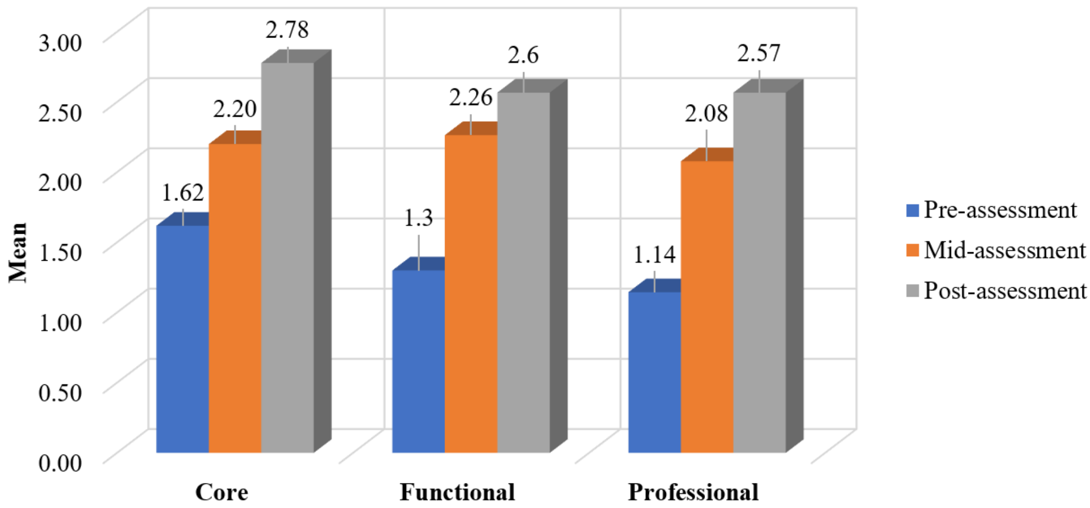

Fig. 4 - Student's expressed competency

3.3.2 Evaluate the Learning Achievement of Students

In this evaluation, the learning outcome evaluation form was applied. This form is a tool used to assess the performance, behaviour, or characteristics of the students with a numeric rating scale of 1 to 5 that rates the effectiveness of the learning outcome in five aspects: 1) virtue and morality; 2) knowledge; 3) intellectual skills; 4) interpersonal skills and responsibility; and 5) numerical analysis, communication, and technology. The educator and factory trainer serve as evaluators.

Results in Table 3 demonstrate that in terms of virtue and morality, self-adjustment has the highest mean at 4.56, followed by an awareness of responsibility. In terms of intellectual, the pursuit of knowledge and continuing self-development and knowledge integration to work mean 4.50 and 4.39, respectively. Regarding intellectual skills, the highest mean is in the analysis with appropriate academic rationale, followed by creativity and supportive thinking (mean=4.33 and 4.28, respectively). Regarding relationship and responsibility, self-adjustment to participate in activities has the highest mean, followed by learning responsibility and creative interaction (mean=4.67 and 4.56, respectively). Lastly, regarding numeric analysis, communication, and technology, students have appropriate information presentation with mathematics and statistics, followed by Thai and English skills for communication (mean=4.44 and 4.39, respectively).

Table 3 - Evaluation of student's learning outcome

Item	Topics	M	SD	Interpretation
	Virtue and Morality			
1	Discipline, punctuality, honesty	4.22	0.71	High
2	Morality, virtue, selfless	4.22	0.71	High
3	Self-adjustment in organization	4.56	0.50	Extremely High
4	Awareness of responsibility	4.39	0.68	High
5	Academic and professional ethics	4.33	0.67	High
	Total	4.34	0.67	High
	Knowledge			
6	Comprehend and understand principle and theories	4.17	0.83	High
7	Apply knowledge for planning and resolving problem	4.17	0.76	High
8	Integrate knowledge to work	4.39	0.68	High
9	Follow up the academic change in the profession and other related fields	4.22	0.79	High
10	Pursue knowledge and have self-development constantly	4.50	0.60	High
	Total	4.29	0.75	High
	Intellectual Skills			
11	Analyse problem with appropriate academic rationales suitable for education level	4.33	0.67	High
12	Design the solution and act	4.17	0.76	High
13	Initiate, create systematically and sensibly	4.28	0.73	High
14	Apply knowledge and skills to problem-solving appropriately	4.26	0.78	High
15	Be able to think and argue with reason	4.28	0.65	High
	Total	4.26	0.72	High
	Relationship and Responsibility Skills			
16	Curricula modernity	4.39	0.76	High
17	Curriculum corresponds to the student' s needs	4.56	0.60	Extremely High
18	Consistency of content and work operation	4.50	0.60	High
19	Appropriate learning plan and duration of study	4.67	0.47	Extremely High
20	Application of content to work operation	4.56	0.60	Extremely High
	Total	4.39	0.76	High
	Numeric Analysis, Communication, and use of Technology Skills			
21	Appropriate knowledge about work	4.33	0.67	High
22	Thai and English skills for communication	4.39	0.68	High
23	Knowledge about mathematic and statistics for analysis	4.11	0.87	High
24	Application of mathematic and statistics to decide and resolve problems	4.28	0.73	High
25	Information presentation with appropriate mathematic and statistics	4.44	0.60	High
	Total	4.31	0.72	High
	Total	4.35	0.71	High

3.3.3 The Satisfaction of Stakeholders

The stakeholders' satisfaction survey results show that respondents have the highest levels of satisfaction with the establishment (mean = 4.61) and students (mean = 4.56). The overall satisfaction of stakeholders with the WIL was high (mean = 4.45). Details are shown in Table 4.

Table 4 - Satisfaction of stakeholders on WIL

Topics	Mean	SD	Interpretation
Students	4.56	0.59	Extremely High
Teachers	4.44	0.69	High
Factory's Trainer (Mentors)	4.46	0.69	High
Curriculum	4.33	0.76	High
Teaching management	4.39	0.64	High
Establishment	4.61	0.53	Extremely High
University and Executive	4.34	0.69	High
Total	4.45	0.67	High

4. Conclusion

This research presents the development of the WIL model for industrial engineering, RUMTL, called CWILE. Regarding the WIL program's fundamental information from the stakeholders, the results indicate that the proposed WIL model should encourage students' intentions by improving the teaching methods. Therefore, the integration method should be more widely applied. Regarding stakeholder needs for producing the desired graduates from the industrial engineering field, most stakeholders agreed that humility, honesty, awareness, and compliance with social rules are necessary. At the same time, students could have training for an extended period to gain more professional skills needed in the workplace.

The CWILE model is subsequently formulated using the data obtained from the survey conducted to gather opinions and identify stakeholder needs. The proposed model comprises four steps. 1) Curriculum development that applies the concept of curriculum development to correspond to competency and stakeholder needs 2) Work-integrated learning plan that uses the WIL concept by determining the guidelines for each component. 3) The learning process is to provide suitable teaching and learning methods for obtaining the desired learning outcome. 4) The evaluation is to evaluate and follow up on the success of the WIL program. The handbooks for the proposed model are introduced to guide the users who want to apply the CWILE model in their WIL program, consisting of the curriculum development handbook, WIL and learning process handbook, and evaluation handbook.

To investigate the efficiency of using the CWILE, it is implemented with 18 samples selected from purposive sampling who were students in industrial engineering at RMUTL. The findings indicate the competency test results for the three dimensions, namely core competency, functional competency, and professional competency, were assessed before, during, and after participation in the WIL program. It implies that the duration of attending the WIL program is positively correlated with the increase in all competencies. In addition, the students can achieve all the required specific learning outcomes and stakeholders' satisfaction with the developed WIL model is demonstrated at a high level.

The CWILE for Industrial Engineering students, Faculty of Engineering, is qualified for implementation. This opportunity provides students with valuable experiences to gain essential knowledge and skills through practical application. These opportunities bridge the gap between theoretical learning and real-world application, providing students with hands-on experience and a chance to professionally apply what they've learned. This experiential learning enhances their understanding, prepares them for the demands of the workforce, and contributes to their overall academic and personal development. Employers often value candidates with practical experience, as it demonstrates the ability to translate theoretical knowledge into practical solutions. WIL experiences also allow students to showcase their skills, work ethic, and adaptability, making them more attractive to potential employers. Furthermore, students who have completed WIL may have an edge in the job market, as they may already be familiar with industry expectations and have demonstrated their ability to contribute effectively in a professional setting.

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