The effectiveness of work-integrated learning in developing student work skills: A case study of Thailand

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Research indicates that work-integrated learning (WIL) experiences enable students to develop both generic and work skills as well as helping students identify their future academic and career directions. This study used pre- and post-survey instruments to evaluate the effectiveness of a WIL placement to develop work skills of students in different academic programs of a university in Thailand. This research was based on an Australian work skills development framework model. The analyses of the pre- and post-survey results on 584 co-op students indicated notable changes in student work skills performance after entering the workplace. The program difference in work skills is significant between the groups when ANCOVA test was applied using pretest-placement as covariates. The positive learning gains suggest that WIL enables students to acquire confidence, building work skills particularly in "initiative/motivation to engage", and attain the ability to self-reflect on whether they have contributed to improved productivity in the workplace.

Keywords: Work skills, work-integrated learning, cooperative education, employability, pre- and post-analysis

The nature of knowledge in the workplace, work, and employment around the globe is swiftly changing (Muhammet & Esma, 2018). Factors that contribute to the changes are the global job market, the sociocultural system, competitive world, growing knowledge-based economy and the rapid development of digital technology (OECD, 2016). To survive in this highly competitive environment, job markets require new graduates with high-level work skills. The demands of the labor market seem to have direct impact on the human development process in higher education systems, in which work skills development plays an essential role in developing students' competencies to meet the needs of modern workplaces in this ever-changing world (OECD, 1996).

From the student's perspective, one of the aims of achieving an academic degree is to enhance the prospects of employability. However, employers expect graduates to possess the requisite knowledge, skills and capabilities, and are able to apply them in the workplace (Butcher, Smith, Kettle, & Burton, 2011). Employers often complain that today's new graduates have inadequate skills to deal with the needs of the modern organization and lack even basic work skills (Khampirat & Pop, 2017; PayScale, 2016). Feedback from employers show that graduates are weak in problem-solving, business understanding, IT management, communication, and teamwork skills (World Bank, 2006). Deutsche Investitions (2016) reported that skills gaps are prevalent in many developing countries and most of the employers complained that graduates were trained only in basic skills. The survey of McGraw-Hill Education (2018) indicated only 41% of U.S. college students are well-prepared for their future careers. Prospective employers found that the major skills that new graduates were found to be lacking were critical thinking, problem-solving, attention to detail, and writing proficiency. This is unexpected because these skills should be developed during studies at the university as they are needed for job

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interviews and to succeed in the workplace (Jaschik, 2015). In general, the global labor market is increasingly rewarding graduates who have adequate soft skills (Schanzenbach, Nunn, Bauer, Mumford, & Breitwieser, 2016), the ability to learn new technologies in each sector, and the ability to respond quickly to work (Lowden, Hall, Elliot, & Lewin, 2011). This implies that new graduates must possess a core set of both cognitive and non-cognitive skills (Deming, 2017; Lezotte & Marder, 2017) as well as being able to work independently. Therefore, higher education institutions (HEIs) must create graduates who are agile, flexible, adaptable and have a sound knowledge (Gaulden & Gottlieb, 2017).

Work-integrated learning (WIL) has been accepted as a highly effective pedagogic method to support a seamless transition from higher education institutions to work. For example, Jackson (2013, 2015) considered WIL as an integration of classroom and workplace learning, where students apply theory to practice, engage in self-reflection to improve work skills and engage in professional practices. Accordingly, student perceptions and experiences of WIL are connected to successful development and implementation of WIL pedagogy. However, WIL programs vary widely in each context across the globe (Khampirat & McRae, 2016) and not all cooperative education (co-op) students are successful in their WIL (Little & Harvey, 2006). The effectiveness of a WIL program is a result of a complex relationship between the characteristics of the institution, supervisor, student, organizational environments and administrators (Khampirat & McRae, 2016). Assessing the performance of co-op students, in particular, how the level of work skills that students have developed through the placement, is very helpful to improve their work readiness and help practitioners and administrators explore and identify strengths and weaknesses of the WIL placement. Therefore, the main objective of this study is to assess the effectiveness of a WIL placement to develop work skills of co-op students in a Thai university. The results obtained in this work can be used as guidelines for the development of WIL placement in other contexts, as well as increasing the work skills of students.

RESEARCH QUESTIONS

This study attempts to answer the following questions:

RQ1: Is there any significant difference between the mean scores of students' perceived levels of autonomy in work skills performance at the beginning (pre) and completion (post) of their work placement?

RQ2: Is there any significant difference between students' gender regarding work skills level at pre- and post-placement?

RQ3: Is there any significant difference between the students' mean scores in the post-placement performance when controlling the mean scores of the pre-placement.

OBJECTIVE

The objective of this study was to assess the effectiveness of WIL on the work skills performance of co-op students in a university in Thailand by investigating levels of autonomy in work skills performance of co-op students at the beginning (pre) and completion (post) of their work placement using a self-assessment approach.

LITERATURE REVIEW

Impact of WIL on Student Work Skills

A key purpose of WIL is empowering graduates with comprehensive skill sets needed by potential employers (Coll et al., 2009; Coll & Zegwaard, 2006). WIL is an effective pedagogical method to equip students with industry-relevant skills. It has been accepted as an instrument to enhance employability capabilities in students (Harris-Reeves & Mahoney, 2017; Helyer & Lee, 2014; Rowe & Zegwaard, 2017) by developing student confidence in their work ability (Clinton & Thomas, 2011), innovation capabilities (Rampersad & Zivotic-Kukolj, 2018), and professional identity (Trede, 2012). In particular, it is assumed it will improve work skills and career self-management skills while participating in a WIL experience in the workplace (Jackson, 2018; McIlveen, et al., 2011).

The concept of work skills refers to the specific job skills required to carry out work functions, as well as the individual capabilities to perform their allotted role (Adams, Webb, Angel, & Bryant, 2003; Timmons, Wills, Kemp, Basha, & Mooney, 2010). It is also concerned with the implementation of talents or capabilities for fulfilling the variety of tasks (Acemoglu & Autor, 2010). Researches in the area of WIL demonstrated that during work placement, students develop some work skills in the workplace, including leadership, entrepreneurial skills, responsibility, decision making, critical thinking, problem-solving, ethical awareness, and ethical standards (Crebert, Bates, Bell, Patrick, & Cragnolini, 2004). In Dwesini's study (2017), employability skills gained from WIL are, for example, self-confidence, communication, team work, professionalism, time management and computer skills. Abery, Drummond, and Bevan (2015) stated that WIL enables students to acquire confidence, build crucial knowledge and skills, and attain the ability to self-reflect on improved productivity, as well as WIL students being highly motivated and more prepared for work in the future. Khampirat (2018) revealed that co-op students, compared with non-co-op students, made greater progress in the development of knowledge and skills in their field, personal attributes, as well as organizational skills. These reviews lead to the conclusion that the most important outcomes associated with WIL are higher-order affective and metacognitive skills (Krathwohl, 2002), including human skills, organizational skills, information skills and knowledge, and skills in study programs, which are important for employability (Khampirat, 2017). However, some students were critical of classroom learning as not adequately preparing them for their placement, particularly in ability to use technology and speak in public to clients and co-workers (Jackson, 2015). Although WIL is reported to lead to significant improvement in work skills, variations in the degree to which skill outcomes improve may indicate certain skills are more malleable than others in the work environment (Jackson, 2013).

Human Capital Theory in Work Skills Development

Human capital theory is a concept of investment in education and /or training to achieve life goals, which play an important role in managing the value of the human resource and society that influences various areas of the everyday life of people (Dhaoui, 2013). The term "human capital" is defined as the stock of knowledge, information, ideas, skills, and health of an individual (Becker, 1993). Bowen (1977) described that human capital consists of acquired knowledge, skills, motivation and energy that people use to produce goods and services. This theory suggests that individuals who invest in education and training will improve their skills, knowledge, and ability levels, besides enhancing their employability and future earnings (Blundell, Dearden, Meghir, & Sianesi, 1999; Dhaoui, 2013). Laroche, Mérette, and Ruggeri (1999) considered human capital as a concept of the combination of abilities acquired by heredity (e.g., physical, intellectual and psychological capacities) and the knowledge and skills that

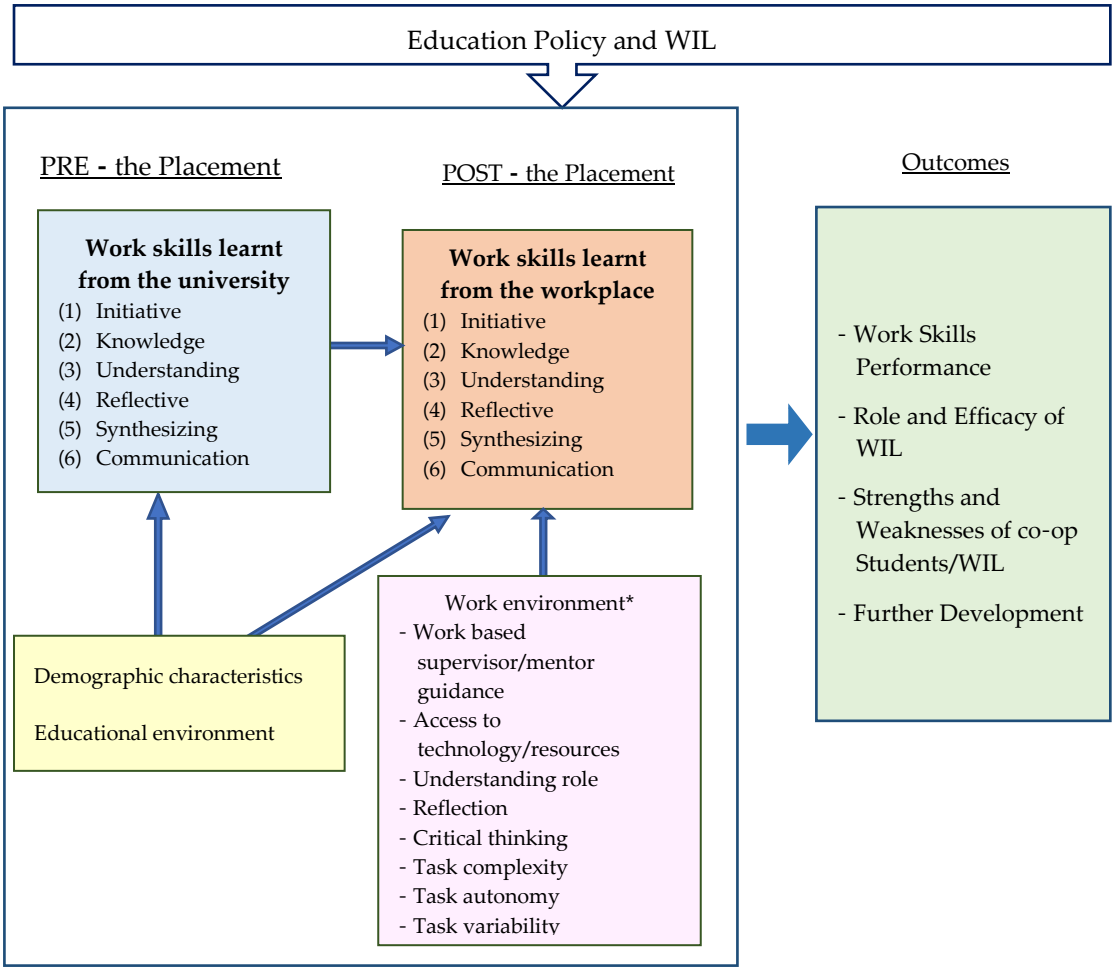
individuals acquire and develop throughout their lives. This can be both quantitative (e.g., years of study) and qualitative aspects (e.g., obtaining a university degree from a renowned university) (Laroche, Mérette, & Ruggeri, 1999). In terms of the work process, human capital is directly related to an individual's ability to apply knowledge and skills in a productive process (Becker, 1993). Quality of human capital may be caused and affected by the internal and external environments of individuals, as well as the structure of society, such as aging, employment status (Laroche, Mérette, & Ruggeri, 1999), self-efficacy, socioeconomic background, educational opportunities, and individual discrimination (Career research, 2018).

The education system is one of the key elements in generating human capital, because it is viewed as a fundamental mechanism for developing knowledge, abilities, and skills (Crocker, 2006). In this sense, learning-by-doing or learning-through-experience is one of the strategies to develop human capital through WIL placement. Empirical study of Levitt, List, and Syverson (2013) showed that learning-by-doing and learning-from-others are necessary for improving performance and increasing productivity. One important element is that HEI can increase the students' human capital by providing training and WIL placement to support them to learn and develop individual work skills from the real workplace environments which will lead to greater employment opportunities (Abeysekera, 2006; Lorraine & Peter, 2007). Reich (1991) anticipated that in the 21st century, because of the rapid development of science and technology, a major problem in developing countries is the lack of sufficiently skilled workers, especially with key skills needed for emerging jobs such as adaptability skills, self-management skills, information management and communication skills, interdisciplinary skills, business skills, and technology skills (e.g. Deming, 2017; Cleary & Fichtner, 2007; OECD, 2017). Ferreira, Künn-Nelen, and Grip (2016) reported that people who participated in training or informal learning show greater improvement in their work skills than those who did not.

METHODOLOGY

Conceptual Framework

This research work was based on an Australian study on pre- and post-placement perceptions of co-op students, which used the framework model for work skills development (WSD) of Bandaranaike and Willison (2010) and the study of Renta Davids, Van den Bossche, Gijbels, and Fandos Garrido (2017). Renta Davids et al., (2017) analyzed the individual characteristics, educational design, and work environment as factors that may interact with the transfer of learning of professional competence. In the present study, the practice model of Renta Davids et al., (2017) was adapted to investigate the levels of autonomy in the work skills performance at the beginning (pre) and completion (post) of the work placement, as shown in Figure 1.



Note. Modified from Renta Davids et al., (2017).

FIGURE 1: Conceptual framework used in the study of the effectiveness of work-integrated learning in developing student work skills.

Participants

The total participations were 584 co-op students in a public university in Thailand. They were in the final year of their bachelor's degree programs in engineering, agricultural technology and information technology. The average age of the participants was 22.5 years, 236 (40.41%) were male and 341 (58.39%) were female. Most of the students (471, 80.65%) did not have any work experience before the beginning of the WIL placement. The demographic profiles of the participants are summarized in Table 1.

TABLE 1: Demographic profiles of the participants (N = 584)

Demographics	Category	Frequency	%
Gender	Male	236	40.41
	Female	341	58.39
	N/A*	7	1.20
Program	Engineering	250	42.81
	Social Technology	257	44.01
	Agriculture	77	13.18
Work experience before beginning the placement	No	471	80.65
	Yes	68	11.64
	N/A*	45	7.71

Note. * no identification.

Procedures

Data collection was completed in November 2017 by one of the researchers, five research assistants and two support staff from the co-op units. Students took approximately 20-30 minutes to complete the survey. As a token of appreciation, notebooks and pens were provided to all of the co-op students participating in the study. The data was recorded using SPSS software with data screening and cleaning prior to analysis. Ethical clearance was received from the Ethics Committee for Researches Involving Human Subjects of Suranaree University of Technology (EC-61-93) to protect all participants in the study. Participants had been formally informed about this data collection. They read the information-sheet to understand the study before deciding whether or not to participate.

Measures

The participants were asked to report their gender, study program, and work experience.

The authors decided to adapt the existing work skills development (WSD) framework developed by Bandaranaike and Willison (2009; 2010) for this study because it is viable in assessment for the levels of autonomy (LoA) of co-op students at the commencement (pre) and completion (post) of their placement. Also, the aspects and scales identified in the WSD framework fitted the purpose of this study and Thailand higher education context. The WSD work skills contained six facets, namely: (1) initiative/motivation to engage (initiative), (2) knowledge and adaptation to technology and resources (knowledge), (3) understanding the role and the desired outcomes (understanding), (4) using reflective practices to monitor performance (reflective), (5) synthesizing and analyzing issues (synthesizing), and (6) communication and teamwork (communication) (Bandaranaike & Willison, 2010; 2015).

Since the original questions were obtained from an interview form (Bandaranaike & Willison, 2015; Quijano & Bandaranaike, 2017), to produce a Thai version, permission was obtained from the copyright owners to allow for the questions to be modified. The WSD questions were reviewed and reorganized to quantitative survey questions, as well as being translated from English into Thai by one of the authors, a research assistant and two experts in English language.

The participants were invited to rate themselves in each facet of work skills by using scoring rubrics in self-performance assessments. The rubric, quantitative labels, contained five levels of autonomy (1-5) ranging from one for highly structured direction and guidance from the supervisor) to five for working

within self-determined guidelines). The meanings of the highest score for each facet are as follows: (1) initiative - identified future goals & projects for the industry, while fulfilling the original role requirements; (2) knowledge - showed a high degree of sensitivity in the application of a range of technology/resources to generate information; (3) understanding - critically evaluated and used knowledge to generate lifelong learning skills; (4) reflective - used reflective practice to articulate vision, goals and innovative strategies; (5) synthesizing - applied sophisticated critical thinking and analysis to initiate change and extrapolate outcomes; (6) communication - in communicating information, you negotiate and assert your own values while respecting the contribution of others.

Since this instrument was in multiple measures of the same construct, having confidence in a measure such as the strength of consistency (Jain & Angural, 2017), that is, how a set of items are closely related with a group (Yang & Green, 2011). Cronbach's alpha (α) was applied to assess internal consistency and reliability (Cronbach & Shavelson, 2004). Coefficient alpha provides an overall reliability for a set of scales and confirms that the scales can be used with confidence to measure the students' perception of their work skills at the beginning (pre, α = .654) and on completion (post, α = .737) of a WIL placement. The coefficients meet the minimum value of 0.60 threshold for adequate reliability in terms of internal consistency, as recommended by Field (2009), Hair, Black, Babin, and Anderson (2010), and Nunally (1978).

Data Analysis

Quantitative statistical analysis was used in the study. The data was analyzed using SPSS software. Descriptive statistics were used to analyze the characteristics of participants. Inferential statistics, the dependent and independent *t*-tests (Kirk, 1999), were used to test the gaps between pre- and post-placement scores and to test the mean differences between genders. Cronbach's alpha reliability (Cronbach, 1951) was used to measure internal consistency. Analysis of co-variance (ANCOVA) (Tabachnick & Fidell, 2007) was used to evaluate whether the means of the dependent variables were equal across levels of independent variables, while controlling the effects of other continuous variables that are not of primary interest.

FINDINGS

Effectiveness of WIL on Improving Levels of Autonomy in Work Skills: Results of Dependent t-test

The dependent t-test was used to determine whether there is a significant difference between the means of two related groups (Kerlinger, & Lee, 2000). Eighteen null hypotheses (H_o) tested that there were no significant differences in six work skills between pre and post placement for overall, male, and female students. If the *p*-value (probability value) of a test is less than or equal to the significance level (0.05), the researcher rejects the null hypothesis, and accepts the alternative hypothesis (H_a) that there are differences between pre and post placement (Cohen, Manion, & Morrison, 2007).

The dependent t-test results in Table 2 and Figure 2 indicated that there was a significant difference at the 0.01 level ($p < .01$) for all six work skills, between the mean scores in perceived levels of autonomy in work skills at the beginning (pre) and completion (post) of placement. In general, co-op students perceived that they had a better understanding in each of the six work skills after completing (post)work experience (Figure 2). Among the work skills examined, the highest improvement was in

"initiative" (mean difference = 2.07, $p < .00$), followed by "understanding" (mean difference = 1.83, $p < .00$), "communication" (mean difference = 1.79, $p < .00$), and "reflective" (mean difference = 1.70, $p < .00$), respectively. Whereas the least improved skills on co-op students' perceptions were "synthesizing" (mean difference = 1.60, $p < .00$) and "knowledge" (mean difference = 1.57, $p < .00$). The values of mean difference and results of dependent t-test are included in Table 2.

TABLE 2: Results of dependent samples t-test to explore mean difference in work skillsbetween pre and post placement (post - pre).

Work skills	Overall (N = 584)		Male Student (N = 236)		Female Student (N = 341)	
	Mean Diff. (post - pre)	*t* - test	Mean Diff. (post - pre)	*t* - test	Mean Diff. (post - pre)	*t* - test
Initiative	2.07	38.52**	1.89	21.06**	2.20	32.94**
Knowledge	1.57	29.28**	1.49	16.04**	1.64	25.24**
Understanding	1.83	35.76**	1.70	19.91**	1.93	30.17**
Reflective	1.70	29.86**	1.67	17.64**	1.73	24.11**
Synthesizing	1.60	28.33**	1.61	18.30**	1.60	21.36**
Communication	1.79	34.67**	1.66	20.64**	1.88	27.64**

Note. Mean Diff. = Raw mean difference between pre and post placement.; * = $p < 0.05$, ** = $p < 0.01$

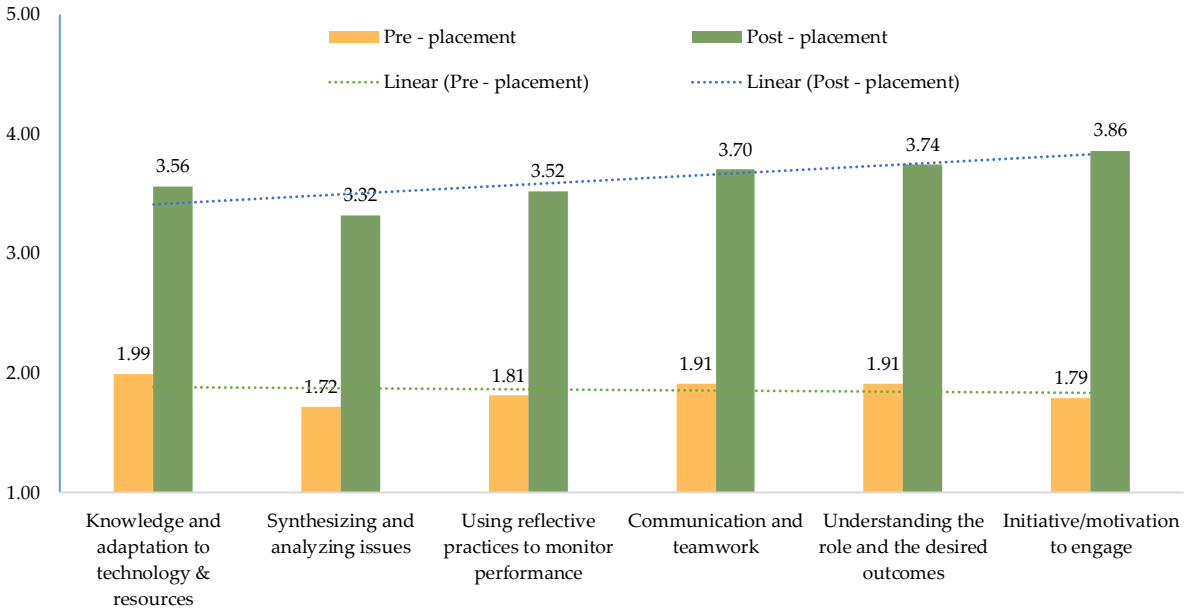


FIGURE 2: The mean overall values for each work skill between pre and post placement.

Regarding the gender variable (Table 3 and Figure 3), the dependent t-test results indicated that there were also significant differences in all six work skills between pre- and post-placement. The most developed work skills were "initiative" (mean difference of male = 1.89, mean difference of female = 2.20), whereas the two least improved work skills for male and female students were "synthesizing" (mean difference of male = 1.61, mean difference of female = 1.60) and "knowledge" (mean difference of male = 1.49, mean difference of female = 1.64). The results of male and female students were quite similar, the highest improvement was in "initiative".

In summary, the differences between the mean scores of students' perceived levels of autonomy in work skills performance at the beginning (pre) and at the completion (post) of their work placement were significant. Likewise, the gaps between pre- and post-placement scores measured by a t-test revealed significant differences for the above-mentioned categories ranging from 1.49 to 2.20 (Table 2).

Perceived Competency in Work Skills: Results of Independent t-test

The independent t-test was used to compare the means of one variable for two independent groups (Kerlinger, & Lee, 2000). Twelve null hypotheses (H_o) tested that there were no significant mean differences in six work skills between students' genders (male - female) at before and after placement. If the p-value is less than or equal to the significance level (0.05), the researcher rejects the null hypothesis, and accepts the alternative hypothesis (H_a) that there are significant differences between male and female on the skill (Cohen et al., 2007).

Comparisons of the mean scores of work skills of male and female students in Table 3 and Figure 3 showed that there was a significant difference ($p < .05$) in the mean scores before WIL placement in "initiative" (male > female), "communication" (male > female), and "reflective" (male > female), whereas work skills after WIL placement of male and female students were not significantly different ($p > .05$). This clearly demonstrates that WIL in the workplace can effectively reduce the work skill gaps between male and female.

TABLE 3: Results of independent samples t-test to test the mean difference in work skills between students' genders (male – female) before and after WIL placement.

Work skills	Pre - placement		Post - placement	
	Mean Diff. (male - female)	*t* - test	Mean Diff. (male - female)	*t* - test
Initiative	0.36	3.95**	0.04	0.52
Knowledge	0.14	1.74	-0.02	-0.24
Understanding	0.08	1.08	-0.16	-1.68
Reflective	0.20	2.44*	0.15	1.63
Synthesizing	0.10	1.28	0.10	0.99
Communication	0.24	2.88**	0.02	0.26

Note. Mean Diff. = Raw mean difference between male and female students.; * = $p < 0.05$, ** = $p < 0.01$

Influences on Perceived Performance: Results of One-Way ANCOVA

Oneway ANCOVA was used in the calculations of score changes (post-placement score minus pre-placement score) after controlling the mean scores of the pre-placement, compared with the mean difference of the students' performance among three programs (information technology, engineering, and agriculture students). The six null hypotheses (H_o) were evaluated by F-test that there are no differences on the adjusted means on work skills among program type, after control of the effect of pre-work skills. The significant statistical level was set at $p < .05$. There was at least one significant difference in mean work skills between the program type if the p-value of F-test is smaller than or equal to the significance level (0.05). If the F-test showed that the mean of all three programs are not equal, then we examined which programs differed using pairwise comparison (or multiple comparison). The mean scores of work skills between before (pre) and after completion (post) of work placement by program type are shown in Figure 4.

The F-test scores obtained from ANCOVA in Table 4 revealed a significant improvement in the levels from covariates (pre-placement) to dependent variables (post-placement) in all of the six facets of work skills ($p < .00$). The results showed that the program differences in "initiative" and "reflective" were significant between the programs ($p < .05$) when ANCOVA was applied to compute change scores using pre-placement results as covariates. However, the effect size ($d = .01$), measured by partial Eta squared (Thompson, 2006), were small, this meant that the difference is unimportant even if it is statistically significant ($p > .05$) (Olejnik & Algina, 2000; Rosnow & Rosenthal, 2003). Figure 5 compares the mean scores of the students' work skills performance after completing (post) the placement while controlling covariates (pre). It was found that the adjusted mean values for the three programs at each facet were slightly different from the unadjusted values, depending on the effects of the covariate (pre-work skills).

In the pairwise comparison (Thurstone, 1927) among means of independent groups, information technology and engineering students increased the levels of autonomy in "initiative" more than the agriculture students. The developing autonomy for "reflective" was the highest for the engineering students, compared with the information technology and agriculture students. The results of the ANCOVA were not significantly different ($p > .05$) among the three programs for "knowledge", "understanding", "synthesizing", and "communication".

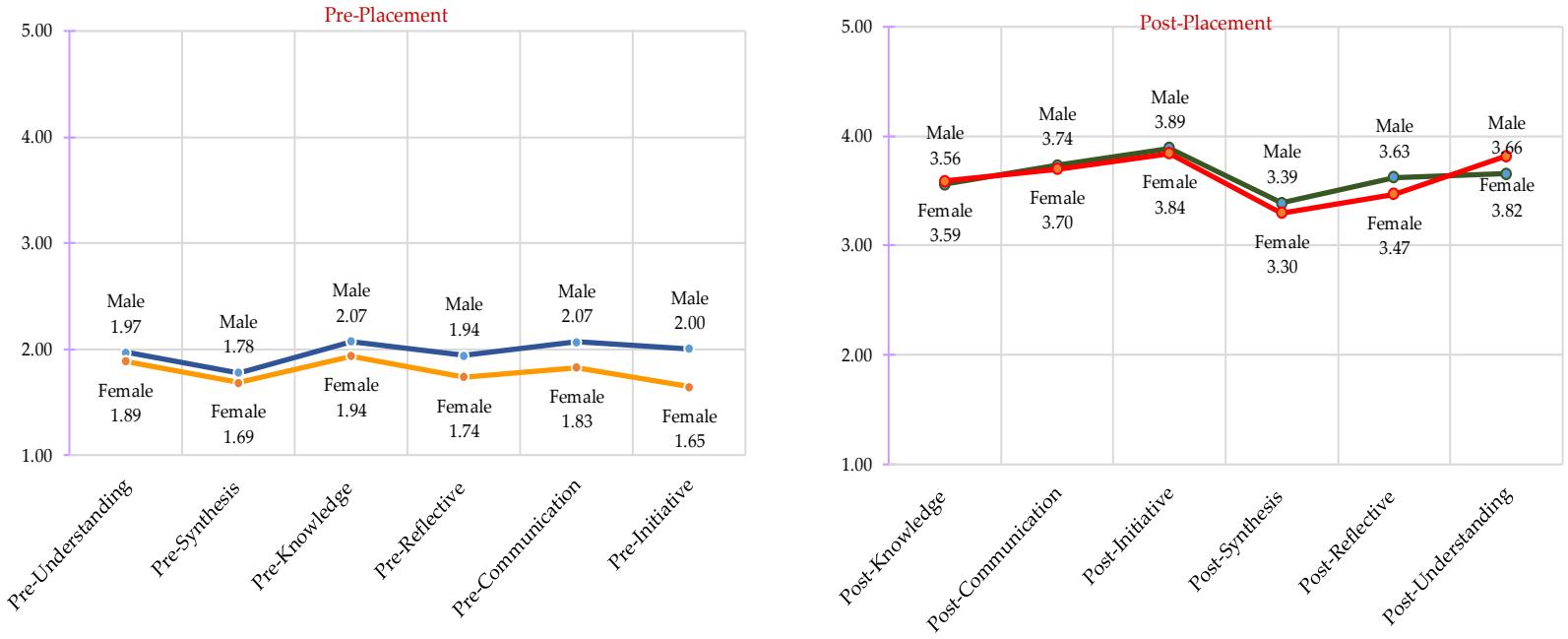


FIGURE 3: The mean scores of work skills between before (pre) and after completion (post) of work placement by gender; based on 1-5 rating scale, 1 = the lowest score, 5 = the highest score).

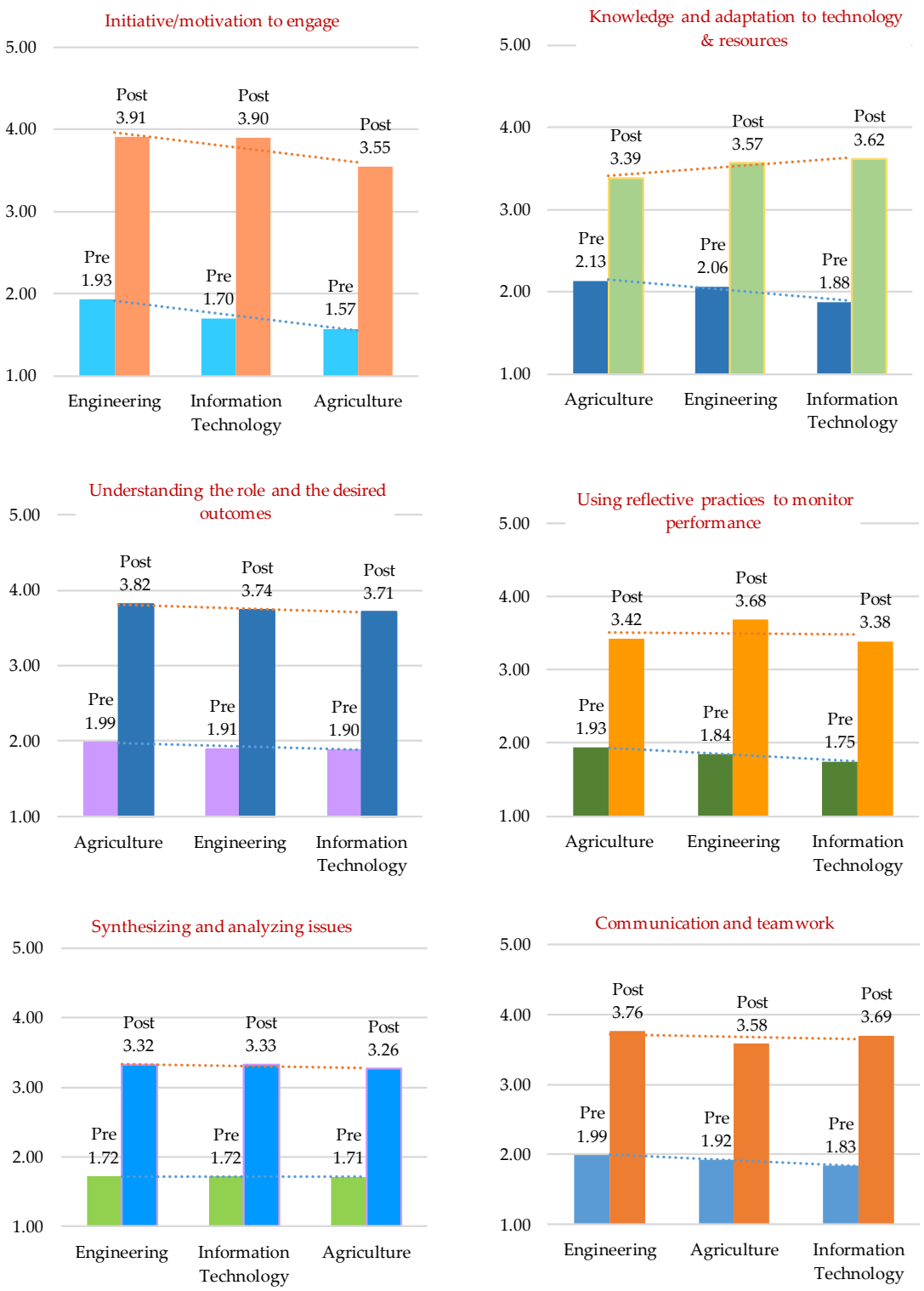
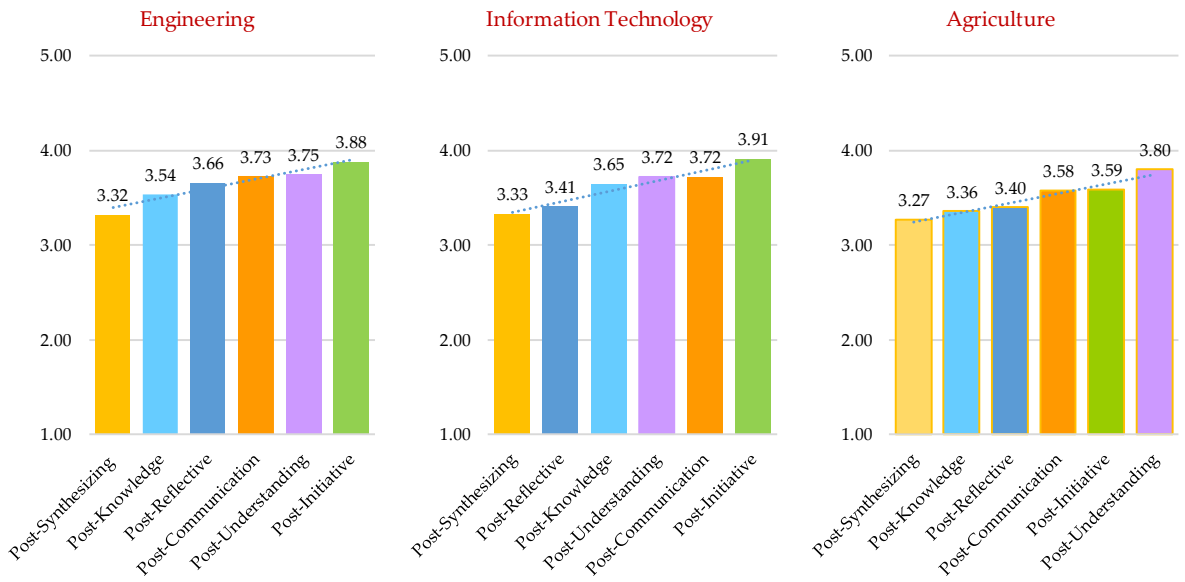


FIGURE 4: The mean scores of work skills between before (pre) and after completion (post) of work placement by program type; based on 1-5 rating scale, 1 = the lowest score, 5 = the highest score).

TABLE 4: Results of ANCOVA to test of difference after controlling difference attributable to pre-work skills.

Dependent variable	Source	*F*-test	Partial Eta Squared (*d*)
Initiative	Pre-placement	23.81**	0.04
	Program	3.36*	0.01
Knowledge	Pre-placement	25.31**	0.04
	Program	2.22	0.01
Understanding	Pre-placement	46.64**	0.08
	Program	0.14	0.00
Reflective	Pre-placement	13.44**	0.02
	Program	3.86*	0.01
Synthesizing	Pre-placement	21.96**	0.04
	Program	0.09	0.00
Communication	Pre-placement	50.58**	0.08
	Program	0.66	0.00

Note. * = $p < 0.05$, ** = $p < 0.01$



Note. The mean values of the covariate (pre-placement) are as follows: Initiative = 1.79, Knowledge = 1.99, Understanding = 1.91, Reflective = 1.81, Synthesizing = 1.72, Communication = 1.91

FIGURE 5: The mean scores of the students' work skills performance after completing (post) the placement while control covariates (pre)

DISCUSSION

The research objective of this study was to assess the effectiveness of WIL, by examining whether there was a significant difference between pre- and post-placement performance among groups of co-op students at a university in Thailand. This investigation provides support for the effectiveness of WIL placement on work skills performance. This finding is in line with previous research in the Thai context which showed co-op students to have greater work skills than the non co-op students (Khampirat, 2017), and a greater willingness to communicate (WTC) in English. Chottum, Kunchai, and Khampirat, 2018) also indicate that WIL assists co-op students to be more willing to communicate in English.

The dependent t-tests indicated that there was a significant improvement in the mean scores of all students across all work skills - initiative, knowledge, understanding, reflection, synthesizing, and communication - after completion (post) of placement. This article provides information related to the hypothesis of human capital theory that the output of WIL helps to improve the work skills by promoting and expanding an individual's ability to apply knowledge and skills in the workplace (Blundell, Dearden, Meghir, & Sianesi, 1999; Dhaoui, 2013). The self-development required to achieve a goal in pre-placement, is known to be triggered by extrinsic motivation (Maslow, 1970) to engage oneself in the workplace. In an effort to try a new work experience, students continue to improve their levels of motivation. Significant improvement in the students' ability to critically reflect and improve their understanding of the role, to rely less on mentor guidance, provide feedback, and develop an in-depth understanding was observed at the completion (post) of the placement.

Overall students obtained a high degree of "initiative/motivation to engage (initiative)" to gain a greater understanding of the co-op role and employer requirements as well as adapt to new situations. At times the expressions of initiative, may be unclear owing to cultural factors like the reluctance to express their thoughts and ideas directly (Burn & Thongprasert, 2005). It may be possible that the Thai culture emphasizes on expressing humility, deference, politeness, calmness, and hierarchy by young people in respecting and obeying seniors (Komin, 1990; Powell, Amsbary, & Hickson, 2014).

In this study, the second highest mean difference between pre- and post-placement was in "understanding the role and desired outcomes (understanding)". Understanding improved in post-performance in evaluating the role, applying theoretical knowledge to practice in the workplace, identifying gaps and in generating lifetime learning outcomes.

The work skill "communication and teamwork (communication)", measured information gathering, understanding roles, assertiveness and confidence, understanding workplace culture and professional ethics, negotiating and respecting others. Post placement as part of a WIL program imbibes co-op students with these skills which are vital for success in the work place. It could be argued that Thai culture is a hierarchical structured society (Wichiarajote, 1973) and incorporates respect for supervisors, mentors, and those with a status higher than oneself. Thai students are often described as being passive (Deveney, 2005). However, some research has shown that Thai students may have reservations in expressing their thoughts (Pattapong, 2015). This could possibly be the reason why the pre/post change was moderate. While the average student demonstrated confidence and assertiveness in communicating information on completing (post) the placement, they still required more confidence to communicate independently and assert their own values when communicating with those perceived as a superior.

The habit of "using reflective practices to monitor performance (reflective)" is often unfamiliar to students, particularly to science and engineering students whose understanding is more focused on

descriptive analysis. Hence the pre/post change was relatively low and confined to using existing structures of reflective practice to master methods and practices during the placement. Further improvements to improve critical self-reflection to initiate change and conclude outcomes could be an extended goal for these students.

Students' pre and post perceptions on "synthesizing and analyzing issues (synthesizing)" or problem solving, was assessed on the basis of whether they used a structured format or worked independently, applied critical thinking, worked collaboratively, and initiated change to conclude outcomes. The work skills "synthesizing" had the second lowest pre/post change in this study. This minimal change suggests that students perceived that their ability to engage in highly structured critical thinking, working collaboratively to produce innovative solutions, initiating change and achieving an outcome was not up to their expectations. Viewed positively this means that the Thai students perceived they can improve further in their role with respect to synthesis and analysis. At the same time, there was an expectation from employers that these enhanced skills should be inherent in university graduates.

In terms of "knowledge and adaptation to technology & resources (knowledge)", students had minimal pre/post change. It was a measure of how students perceived their use of technology and resources to find and generate information. This minimal change is not conceived as an incapacity to use technology and resources in the workplace. During the past decades, Thailand has had heavy investment in technology infrastructure to enhance human ability and quality of life (Thajchayapong, Reinermann, Goodman, & Pipe, 1997). Technologies were available for students to practice and improve their skills in technological applications before the internship and therefore familiarity with modern technology has resulted in technological independence amongst Thai students and minimal pre and post variation in autonomy. It also had the highest perceived ranking among the six work skills, at pre- placement. These are skills that can mainly be acquired in the workplace. They are also valued by employers who invest heavily in technology and resources to become competitive in the delivery of goods and services.

The findings of the independent t-test provide preliminary support that WIL in the workplace can effectively reduce the work skill gaps between male and female. In summary, the result of statistical analysis proves the effectiveness of WIL in training students for employability. The results of this study are generally in agreement with Abery et al. (2015), who concurred that WIL enables students to acquire confidence, build knowledge and skills, and attain the ability to self-reflect on whether they have contributed to improved productivity in the workplace. Their study found students perform better in their major subjects during and after work placement and are able to understand and apply theoretical constructs better upon their return to university. In addition, Abery et al. (2015) stated that WIL students, particularly those that are highly motivated, reflect on the output of work placement and feel more prepared for work, regardless of the industry or workplace where they may find employment. They can adapt to different workplace environments. These are precisely the generic skills that WIL fosters to create "employable graduates".

Another point to consider is that the information technology and engineering students increased the levels of autonomy in "initiative/motivation to engage" more than the agriculture students. The developing autonomy for "using reflective practices to monitor performance" was the highest in the engineering students, compared with the information technology and agriculture students. The level of student performance will depend on the knowledge taught at the tertiary institution and the specific industry requirements in the workplace. This further demonstrates the value of WIL in preparing students for the world of work.

Having good work skills is not only important for an occupation, it can also have a positive effect on a students' life skills (Ibarraran, Ripani, Taboada, Villa, & Garcia, 2012). Having an effective mentorship system is one of the key strategies for developing a student's work skills (Ramirez, 2012). On-the-job training, coaching and mentoring are considered particularly beneficial by students from all disciplines (Jackson, 2015). When students are given more responsibility, provided with different challenges and a broader range of problems for analyzing and solving (Jackson, 2013), they are able to acquire work skills, effectively perform, and add value to their organizations and personal life.

THEORETICAL AND PRACTICAL IMPLICATIONS

Strengths of the Study

While scoring rubrics were especially well-suited for assessing the complex facets and in the use of various statistical tests, the methodology in this study also ensured that the findings were empirically-informed, which investigated the effectiveness of WIL from an adequate sample size and representative of the target population. The skill facets and their respective attributes were derived from a validated framework. The work skills development framework has been proven valid and reliable.

Limitations

There are some limitations in this study. First, the data was obtained based on self-reporting assessment, which might be impacted by participant bias, overestimation or underestimation. Second, the study only investigated the level of work skills in isolation. Such studies might not lead to the understanding of the factors that could also contribute to work skills performance. Third, the data came from three departments of a specific university. One ought to be careful not to generalize the findings to all universities in Thailand. Finally, in terms of non-experimental design, researchers were not able to control or manipulate the predictor variables or subjects. It must be noted that in assessing pre/post student progress, there is a limit on internal validity because there might be extraneous variables that directly affect how the independent variables act on the dependent variables.

Future Study and Implication

Although this study was based on co-op students at a university in Thailand, the approach could be applicable in other higher education institutions. A comparison between the student's family's background or socioeconomic status and countries could be of interest in future research. It may also be useful to take into consideration the effects of supervision and mentor assistance on work skills performance. To support the construct validity of the instrument or work skills framework, future research may test validation of the instrument in different cultures and consider the influence of independent and mediator variables on work skills performance. Similarly, the effects of WIL on professional success should be studied, possibly through a longitudinal method.

CONCLUSION

This research has contributed significantly to the assessment of pre- and post-work skills performance of co-op students, based on an established WIL assessment model, and validating the results via statistical testing. The results showed that students' work skills before starting the placement are in general very low (Quijano & Bandaranaike, 2017), whereas after completion of the placement, they become very high. These findings highlighted the strengths of WIL pedagogy and confirmed the necessity to include WIL placement in all academic programs in higher education institutions. Beyond

that, in order to be an effective co-op student and to build their capacity to do the complex work, higher education institutions should have effective training, coaching, mentoring, and consulting systems as the key strategies for developing student's work skills both in the workplace and at university level, whereas students are responsible for their own behavior and learning as lifelong learners in accordance with various stages of development to be able to apply their knowledge and skills for working effectively.

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