

# POSTER PRESENTATION

## Education

Graduate School

Valaya Alongkorn Rajabhat University under the Royal Patronage



## THE STUDY OF GRADUATES' PERFORMANCE IN GENERAL EDUCATION

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### ABSTRACT

This research study aimed to compare the level of knowledge and skills gained from courses General Education (GE) to use in their work or lifestyle of Graduated in bachelor Degree King Mongkut's University of Technology Thonburi who has working experiences and different. Sampling group is total of 1,994 graduated students of King Mongkut's University of Technology Thonburi. The samples were selected by using simple technic by means of opening the Krejcie and Morgan's sample size table. There are 25 questions: five levels of Rating scale was used as an evaluation tool. Descriptive analysis and One-Way Analysis of Variance (One-Way ANOVA) were used in Program SPSS. The results were as follow: 1) Graduated students who have more working experiences see an importance of learning the course GE than groups who less working experiences at .05 level of significance 2) Graduated students who have more working experiences can apply the knowledge and skills gained from the GE course than groups who less working experiences at .05 level of significance.

**Keywords:** knowledge, Skill, General Education, Graduates, Performance

### Introduction

King Mongkut's University of Technology Thonburi commits to produce the graduates who are equipped to have both a great competency and good citizenship. In order to achieve this aim, KMUTT plans to develop an excellent student community. The community hopes to strengthen all students to be a self - reliance, to learn outside a classroom, and to become a 'perfect' human (Humanization). Thus, the new curriculum in the year 2010 of KMUTT is developed with these aims in mind. The developed curriculum designs for all students to take 31 credits under the 'banner' of GE: 25 credits are compulsory, and the rest are elective. With this aim in mind, each subject must have a set of activities guided by the knowledge from both science and technology, and society. These activities desire to encourage the students to know how to analyze and apply the knowledge in a real situation. It hopes to enable the graduates to know how to utilize the learnt knowledge in their lives after their graduation (Wilson & Livingston, 1996). The idea of these types of learning bases on Problem-Based Learning and Activity-Based Learning.

The purpose of all courses under GE curriculum is: (1) To cultivate a moral and ethical integrity with social responsibility, and to have a respect for difference of

opinion. (2) To enhance their love for knowledge and know how to find it, as well as to have a better ability to think systematically and logically. (3) To broaden the 'horizon' of the graduates so they can handle all changes that may not only come from the local, but also the national as well as the internationals. (4) To appreciate an art, a culture, and the nature. (5) To develop a language skill so as to have an effective communication, and to be able to apply in their study appropriately. (6) To enable the students to know how to utilize their learnt knowledge for their daily living, so as to prepare them to live in a more complex society due to the advancement of science and technology.

The curriculum development is importance because if makes the learners be creative to change. It's just like the map that indicates how much the potential of education is to estimates to follow how much the learners who help get indicator data to show the efficiency procedure how to manage the activity of learning and teaching that is to cover to the budget or not. To know about the strength, the weakness and is to use the data to improve and developing the task procedure to organize the activity of learning and teaching.

KMUTT has taken a lead role in teaching students to GE courses since 2010 but has never been a study of knowledge and skills gained from GE's graduated students who apply it in their work and their real life. Therefore, The Office of Education (Office of General Education) will improve it again in 2015 so we need to gather empirical data for the review of educational policies to develop curriculum which affects to the quality of graduated students. Development of activities for students with desirable characteristics requires improving the environment affect responds of student and university and can be useful in the management plan of the university in accordance with the requirements along sides with the labor market as well.

### **Research Objectives**

1. To compare how important level of learning in general education of graduated students who has more working experience and different results.
2. To compare level of knowledge and skills application gained from GEN course of graduated students that have different work experience.

### **Desirable Characteristics in the GE at KMUTT**

For almost four decades, the GE curriculum in Higher education in Thailand faced a difficulty in clarifying both a boundary and a purpose of the study as well as the unclear of a 'job' description of the courses under the 'banner' of the GE. The problem started to resolve in 2005 when Ministry of Education requires the GE curriculum to be designed to produce the graduates who are better equipped for the challenges in this twenty first century. The education must enable people to utilize their learnt knowledge in a way that benefits them for the better. That is to help them to live and thrive in life both at the present and in the future.

With this in mind, the Board Office of Higher Education establishes Thai Qualifications Framework for Higher Education (TQF: HEd). It is to guarantee the quality of Thai graduate at all departments. It also hopes to how all people both inside

and outside the country can have a confidence in Thai graduates: that Thai graduates are not inferior to anyone who graduated anywhere in the world. TQF consists of five areas, as following:

1. Ethics and Moral mean firstly, it will design to equip students to develop a good ethics and integrity, as well as to recognize their responsibility in both a personal level and society. Secondly, it must also help students to be able to adapt themselves accordingly to the life challenges such as the conflict in values. Thirdly, it should help students to develop a good moral in all level of their engagements.

2. Knowledge means the ability to comprehend; to think, to present, to analyze as well as to identify facts in a principle, a theory and a process. This includes the ability to learn without a teacher.

3. Cognitive Skills means the ability to analyze a situation, and to implement the learnt knowledge, as well as the understanding of any learnt principle, theory and process theory to an unexpected situation.

4. Interpersonal Skills and Responsibility means the ability to work in a group, including a leadership quality. The graduates must be trained to be responsible in oneself and one own action not only for oneself but also for the sake of others. They must also learn to plan and be responsible for their own learning.

5. Numerical Analysis, Communication and Information Technology Skills means the ability to analyze numbers. The learners must be able to utilize all learnt knowledge from mathematics, statistics, as well as communication skills in both speaking and writing and information technology in any given situation in their lives.

Since 2010, KMUTT has developed a new curriculum guided by TQF. This curriculum aims to broaden students' horizon of learning, to enlarge their vision, to have a right perception of self, others and society. At the end of the course, it hopes that: the graduates will have a heart to learn. They can think logically, and can communicate effectively. Good morals are held. They will value the art and culture both inside and outside Thailand. Above all, they can utilize their learnt knowledge to live and work excellently in all society. This idea was in line with the declaration of Education Ministry as it was declared on 25 May, 2010 by Ministry of Education.

Apart from these desired outcomes, the Standard framework from a national higher education in 2009, general philosophy according to the standard of undergraduate scheme in 2005 were a main resource in how GE curriculum was structured. The curriculum also considered to add a necessary knowledge which it will help students to develop their learning skill in each subject. How KMUTT's GE curriculum in 2005 is in accordance with TQF can be seen in Table 1 (see below).

TQF	TQF1	TQF2	TQF3	TQF4	TQF5
	Ethical and moral development	Knowledge	Cognitive skills/ Learning skills*	Interpersonal skills and responsibility	Analytical and communication skill
<b>KMUTT-STUDENT T QF</b>	KMUTT's citizenship, Social Responsibility, Humanization	Knowledge	Thinking Skill, Learning Skill, Professional Skill, Management Skill	Humanization, Adaptability, Leadership, Social Responsibility	Thinking Skill, Learning Skill, Professional Skill, Management Skill, Communication Skill

\* The qualification standard scale in higher education in learning, that is increased in the part of general education curriculum in KMUTT. That is combined in the cognitive skills.

Source: KMUTT C4ED (<http://www.c4ed.kmutt.ac.th/home>)

Five subjects were required for the graduates who finished their degree in 2014, as following:

#### **GEN 111 Man and Ethics of Living**

This course studies the concept of living and working based on principles of religion, philosophy, and psychology by fostering students' morality and ethics through the use of knowledge and integrative learning approaches. Students will be able to gain desirable characteristics such as faithfulness, social responsibility, respect for others, tolerance, acceptance of differences, self-discipline, respect for democracy, public awareness, and harmonious co-existence.

#### **GEN 121 Learning and Problem Solving Skills**

This course aims to equip students with the necessary skills for life-long learning. Students will learn how to generate positive thinking, manage knowledge and be familiar with learning processes through projects based on their interest. These include setting up learning targets; defining the problems; searching for information; distinguishing between data and fact; generating ideas, thinking creatively and laterally; modelling; evaluating; and presenting the project.

#### **GEN 231 Miracle of Thinking**

This course aims to help the students learn to define the description, principle, value, concept and nature of thinking. It is for developing students to acquire the skills of systematic thinking, systems thinking, critical thinking and analytical thinking. The Six Thinking Hats concept is included. Moreover, idea connection, story line and writing are explored. Examples or case studies are used for problem solving through systematic thinking using the knowledge of science and technology, social science, management, and environment, etc.

### **GEN 241 Beauty of Life**

This course aims to promote the understanding of the relationship between humans and aesthetics in a amidst the global culture. It is concerned with the perception, appreciation and expression of humans on aesthetics and value. It is hoped that students will be able to experience learning that stimulates an understanding of the beauty of life, artwork, music and literature, as well as the cultural and natural environments.

### **GEN 231 Modern Management and Leadership**

This course examines the modern management concept including basic functions of management-planning, organizing, controlling, decision-making, communication, motivation, leadership, human resource management, management of information systems, social responsibility- and its application to particular circumstances.

The evaluation of the learning outcome from these five subjects are guided by 6 attributes according to desired characteristics as following: (1) Ethics and Moral, (2) Knowledge, (3) Cognitive Skills, (4) Interpersonal Skills and Responsibility, (5) Numerical analysis, Communication and Information Technology Skills, and (6) Learning Skill.

Table 2 Defines knowledge and skills are used to measure the desirable characteristics of GE courses.

<b>Attribute</b>	<b>Definition</b>	<b>The desired Knowledge and Skills</b>
<b>Ethics and Moral</b>	The principle of goodness, beauty and righteousness, which will be expressed in action, speech and mind.	- Integrity - Responsibility - Discipline
<b>Knowledge</b>	The ability to memorize, understand, and analyze and classify facts as well as the ability to present information, principles, theories and processes	- A board understanding of the subject - An application of that knowledge for a purpose of explanation - Wisdom in utilizing the learnt knowledge in different situations.
<b>Cognitive Skills</b>	The ability to allow information, gathering and process data to broaden their attitude, and mind-set. The better practice will be developed as a result.	- Critical Thinking - Problem solving and decision making - Creative Thinking
<b>Interpersonal Skills and Responsibility</b>	It is a relationship between the individuals. It can be expressed in term of	- Teamwork quality - Leadership quality - Management quality

Attribute	Definition	The desired Knowledge and Skills
	cooperation, the exchange of information or idea. It is also included the respect for others and the ability to work as a team.	- EQ (respect for others, endurance, self-realization and a healthy emotional management)
<b>Numerical analysis, Communication and Information Technology Skills</b>	<p><b>Numerical analysis</b> The ability to interpret data into facts for making a better decision.</p> <p><b>Communication</b> The ability to bring information and thoughts to others through different channels of communication.</p> <p><b>Information Technology</b> The ability to use technology to develop their knowledge and skills</p>	<ul style="list-style-type: none"> <li>- Choose to use an appropriate technique to give and receive data.</li> <li>- Effectively presenting information</li> <li>- Be able to discern media and handle with information of the changing world (The ability to scrutinize the facts from the information given.)</li> <li>- Using language correctly at times according to academic standard as well as in an appropriate manner in each situation.</li> </ul>
<b>Learning Skill</b>	The ability to replicate the past practice which can bring out the same or even better result.	<ul style="list-style-type: none"> <li>- The technique of searching for knowledge (Learning by the control of self)</li> <li>- The development of practical skills</li> <li>- The ability to develop self-access learning</li> <li>- Have a desire for knowledge</li> <li>- The ability to have self-assessment.</li> </ul>

### Sample Group

1,994 of KMUTT's students, who graduated taking credits in those five subjects. The samples were selected by using simple technic.

### Methodology

1. 38 questionnaires were designed according to evaluate six attributes (see in table 2). They were created in order to assess whether the graduates had acquired the

desired outcomes after they passed all five courses in a 'banner' of GE. Each question had five levels to be rated: from (1) Very Weak. (2) Low (3) Moderate (4) High, and (5) Very High.

Example Question	Importance of level	Application to work and live life of level
00. Basic general knowledge in the field of study		

2. The subject leader of all 5 modules under this GE curriculum were called to select and modify the set of questionnaires which designed to evaluate the desired outcomes. This set consisted of 25 questions: Ethics and Moral, Knowledge, Cognitive Skills were each assessed with 3 questions. Communication and Information Technology Skills and Learning Skill were each assessed with 4 questions. Interpersonal Skills and Responsibility were assessed with 8 questions.

3. The procedure to analyze the quality of questionnaires to use discrimination and reliability.

- Discrimination by item - total correlation to use Pearson product-moment correlation, the measurement 25 questionnaires that is discrimination power ranging .54 - .71.

- Reliability to use Alpha - coefficient, the measurement instrument that is reliability of .94

4. Then, this set of 25 questionnaires was used to convey data from 2,741 students who succeeded in Bachelor degree in 2014. They have been taken to recruit the estimate format to fill the accurate data with every question and enroll in General Education since the academic year in 2010. There are all five subjects that are able to use in analyze. However, there was only 1,994 from the interviewers which had all information that can be used for assessing our aim (72.75% of those surveyed).

5. The criteria are set to translate the result due to each attribute was assessed with an inequality in number of questions. Some was assessed with 3, others with 4 and with 8 questions (see in 2). Thus, the raw score of each question must be modified to T-score, and used this T-score to divide a level of each attribute.

6. The researcher analyzed the collected data using Statistical Package for the Social Science (SPSS program) as follows:

- Analyzing basic statistics of the studied variables in order to know the characteristics of the sample group by calculating the mean and standard deviation (S.D).

- The inferential statistics using in this research were One-Way ANOVA and F-test.

### Results

This section is to show the analysis of desired Characteristics of the graduates. The characteristics that were a result of their study in General Education: the integral group consists of 5 subjects. This is to see how the graduates applied the knowledge and skills in their working place and daily life.

1. To compare how important level of learning in general education of graduated students who has more working experience and different results

Table 3 ANOVA Result

Group	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	42.65	4	10.66	16.13*	.00
Within Groups	978.15	1480	.66		
Total	1020.80	1484			

\*p < .05

Table 4 Post Hoc Multiple Comparison

Working Experience	1 – 3 Month (Mean 3.24)	4 - 6 Month (Mean 3.35)	7 - 9 Month (Mean 3.44)	10 – 12 Month (Mean 3.61)	> 12 Month (Mean 3.80)
1 – 3 Month (Mean 3.24)	-	-.116	-.208	-.374	-.564
4-6 Month (Mean 3.35)		-	-.093	-.258	-.448
7-9 Month (Mean 3.44)			-	-.165	-.356
10 – 12 M (Mean 3.61)				-	-.190
> 12 Month (Mean 3.80)					-

Refer to table scale 3 - 4 showed that graduated students who has more working experience has more importance of learning GEN course than groups of who has less working experiences accordingly. Revealed the differences appear in pairs. Statistically significant level .05. 1) Graduated students who have working experience of 1-3 months. They have different view point of importance to learning GEN course compare with graduated students who have working experience of 4-6 months, 7-8 months, 10-12 months and over 12 months. 2) Graduated students who have working experience of 4-6 months. They have different view point of importance to learning GE course compare with graduated students who have working experience of more than 12 months. 3) Graduated Students who have working experience of 7-9 months. They have different view point of importance to learning GE course compare with graduated students who have working experience of more than 12 months.

2. To compare level of knowledge and skills application gained from GEN course of graduated students that have different work experience.

Table 5 ANOVA Result

Group	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	49.61	4	12.40	20.14*	.00
Within Groups	910.34	1478	.62		
Total	959.957	1482			

p < .05

Table 6 Post Hoc Multiple Comparison

Working Experience	1 – 3 Month (Mean 3.35)	4 - 6 Month (Mean 3.47)	7 - 9 Month (Mean 3.59)	10 – 12 Month (Mean 3.88)	> 12 Month (Mean 3.93)
1 – 3 Month (Mean 3.35)	-	-.123	-.240	-.527	-.582
4-6 Month (Mean 3.47)		-	-.117	-.404	-.459
7-9 Month (Mean 3.59)			-	-.287	-.342
10 – 12 M (Mean 3.88)				-	-.055
> 12 Month (Mean 3.93)					-

Refer to table scale 5 - 6 showed that graduated students who have more working experience apply knowledge with skills gained from GE course more than groups who have less working experience. This comparing the differences appear in pairs. Statistically Significant level .05. 1) Graduated students with 1-3 months of working experience apply the knowledge and skills well gained from GE course differently from graduated students with working experience of 4-6 months, 7-8 months, 10-12 months, and over 12 Months 2) Graduated students with 4-6 years of working experience apply the knowledge and skills gained from GE course differently from graduated students with working experience of 10-12 months and more than 12 months 3) Graduated students with 7-9 months of working experience apply the knowledge and skills gained from GE course differently from graduated students with working experience of more than 12 months.

### Discussion and Conclusion

1. Graduated students who have more working experiences see an importance of learning the course GE than groups who less working experiences. This was significantly different in statistics level .05. This was significantly different in statistics

level .05. This idea is in accordance with the standard of Higher Education in 2005. This was the reason why this GE curriculum focused on the development of a person, and not an academia. The direction is set to firstly equip a student to process a better quality as a person, and knowledge content to be followed. However, this is not to say that an academia is not important. There must be a balance training between a quality development and an academic knowledge in which it produces the graduates who have a good characters and skillful in their expertise (The improvement of how to develop the curriculum in General Education, 2007).

KMUTT aims to produce the graduates who will become a leader of global citizen. Thus, firstly, the graduates must have a good ethic and moral as well as integrity. Secondly, they have to be skillful in learning and be innovative. They must also be skillful in their expertise, have a good skill for life and work in general. Thirdly, they must also be skillful in acquiring information, communication and technology, Lastly, they must be aware of the impact of the inter-changing world. However, the credit of courses under the 'banner' of General Education is only one-fourth of the total credit of bachelor degree, if KMUTT to achieve that aims, all other courses must also have to develop their curriculum, which facilitates that aims or have some activities outside classroom which help the graduates to develop that characteristics.

2. Graduated students who have more working experiences can apply the knowledge and skills gained from the GE course than groups who less working experiences. This was significantly different in statistics level .05. They neither use the knowledge and skill which have received in general learning subjects to use it completely nor acknowledge that how important of general learning subjects. If you desire the students to acknowledge the usefulness from general learning subject, you must organize its suitable learning content to the basic learner. This idea is in line with Miller and Winston (1991) who states that the development in human being is a process and accumulation. A person is in a process of development at all time, but the direction of it depended on the experience of each person. Although there is an effort to decrease the development in some way, there is still some development in some other way. The development is a cumulative process that occurs naturally: skills and experience that a person learned in the past will influence in a future development of that person.

#### **Research suggestions**

In order to check the reliability of the data, there should be a long-term project which plans to follow up the result from the graduates. Data should be collected from the graduates and an owner or a leader of that workplace by interview and questionnaires.

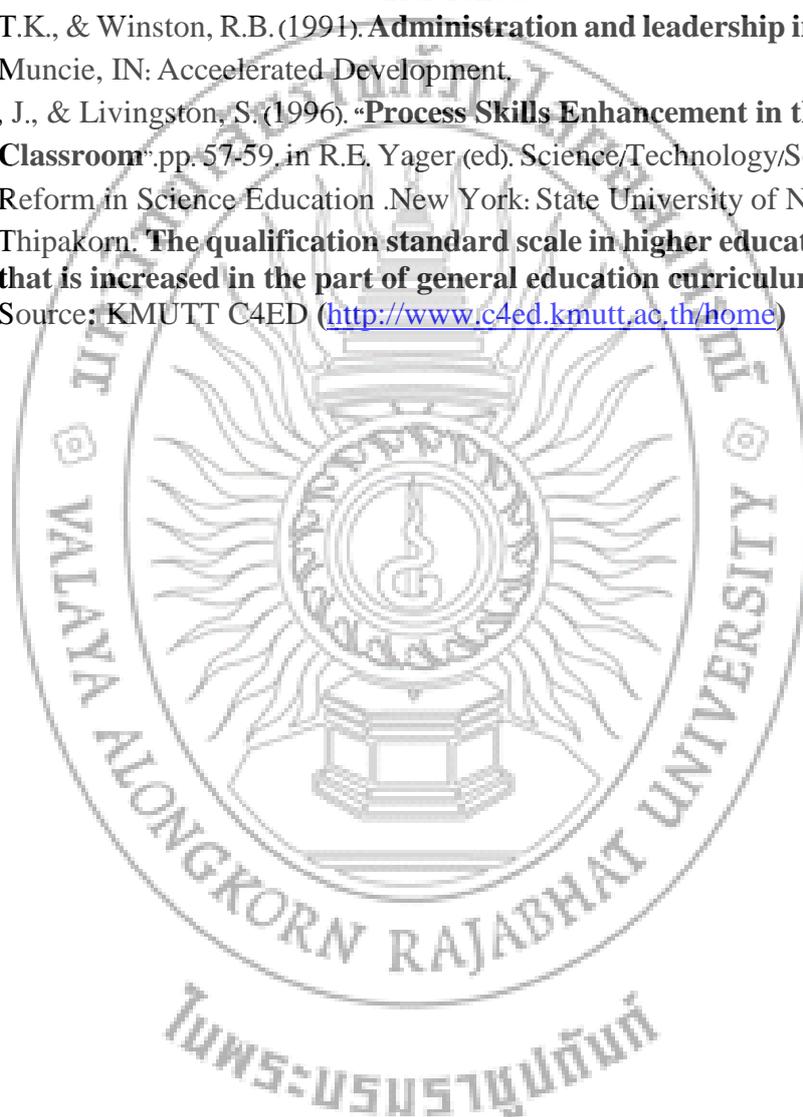
The next step of this research should have an evaluation of the desired outcomes that would help the researchers to develop the process of learning and teaching, and curriculum that will improve the quality of the graduates. It should also be helpful information for the university in planning how to design the curriculum that would have desired outcomes as well as meeting the needs of the labour market.

### Acknowledgments

The students of King Mongkut's University of Technology Thonburi (KMUTT) who graduated with a bachelor degree in 2014, and taking credits in those five subjects.

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Source: KMUTT C4ED (<http://www.c4ed.kmutt.ac.th/home>)



## EVALUATION OF THE ABILITY ESTIMATES UNDER THE BI-FACTOR TESTLET MODEL

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### ABSTRACT

When a test is composed of testlets, such as items associated with common reading passages, a bi-factor testlet model has been proven to be effective in item-level test data analysis, as well as estimation of abilities. The objective of this study was to investigate the quality of ability estimates under some bi-factor testlet model specifications by focusing on the correlations between testlet factors through a simulation study. We focused on two models; (a) a conventional two-parameter bi-factor testlet model with zero correlations between factors, and (b) a modified two-parameter bi-factor model with freely estimated covariances between testlet factors. The results showed that the correlations between general factor and testlet factors were all positive. However, the correlations between testlet factors were all negative. We compared these results to correlations between observed summed scores for testlets as well as for the total test score.

**Keywords:** adult education, community, female, Paulo Freire

### Introduction

A testlet-based item response theory (IRT) model can be a valuable modeling framework for educational assessment for several reasons. First, testlet IRT model may provide more information than conventional IRT models. For example, a researcher may be interested in the predictive relationships between testlet and general factors. Also, with a testlet model, we can directly examine the strength of associations between testlet factors and their associated items, which is simply done by evaluating factor loadings. Finally, testlet models can be easily applied to various educational measurement practices, such as computerized adaptive testing (CAT) and test equating. For these reasons, its utilities have been investigated and documented by many authors (e.g., Chen et al., 2006; DeMars, 2006; Li, Bolt & Fu, 2005; Li, Bolt & Fu, 2006). However, much attention has not been given to associations between testlet and general factors, probably because the bi-factor testlet model assumes testlet factors are nuisance factors and uncorrelated to the general factor. However, if testlet factors are in fact correlated with the general factor, it raises a question regarding their validity depending on the direction and magnitude of the correlation. This study numerically investigated the quality and characteristics of ability estimates under the bi-factor testlet IRT model by focusing on the correlations between testlet and general factors. More specifically, correlations between ability estimates for testlet and general factors were investigated. We also investigated another form of testlet scores, which was the sum of general factor and the testlet factor scores.

## Research Objectives

In this study, we focused on two testlet IRT models; (a) a conventional two-parameter bi-factor IRT model, and (b) a modified two-parameter bi-factor IRT model. We also evaluated correlation between observed testlet total scores and total score for the entire test.

## Methodology

### Modeling

This study focuses on two bi-factor testlet IRT models. The first model is a conventional two-parameter bi-factor IRT model. This model can be viewed as a direct extension of the 2PL IRT model with additional secondary factors that represent testlet effects. A factor corresponding to ability in the 2PL IRT model is referred to as a general factor. On the other hand, a factor associated with each testlet is referred to as a specific factor or a testlet factor. In this model, a covariance between any two factors is constrained to be zero, and we refer a model with this constraint to as the conventional two-parameter bi-factor testlet IRT model. The second model is a modified version of the first model, where the covariances between testlet factors are freely estimated. We refer this model to as the modified two-parameter bi-factor testlet IRT model.

### Simulation Design

3 magnitudes of testlet effect [very small (0.0001), small (0.1) and large (0.4) in the standardized general factor ability scale], 2 magnitudes of discrimination power [weak (0.5) and strong (1.5) in the logistic scale], and 2 sample sizes [small (500), and large (1,000)], totaling 12 simulation conditions were considered in this study. It was assumed that the test was consisted of 3 testlets, where each testlet contained 5 dichotomously scored items with item difficulties ranging from -1.4 to 1.4. These item difficulties were fixed for all 12 simulation conditions. It was assumed that examinees' abilities were randomly sampled from the standard normal distribution. It was also assumed that the testlet effects were normally distributed with mean of zero and variance of either 0.0001, 0.1 or 0.4, depending on the simulation condition.

Based on these specifications, dichotomous item response data were randomly generated by the 2PL conventional testlet model with zero covariances between all factors. We evaluated how the estimated factor scores were correlated under each of the conventional two-parameter bi-factor testlet model and the modified two-parameter bi-factor testlet model. We also evaluated correlations between subscale testlet raw score and testlet total scores. Parameter estimations were conducted by Mplus software. Real data set with 6 testlets, 9 items in each testlet, with 1,000 examinees was also investigated.

## Research Results

The correlations between subscale testlet raw scores were all positive, ranging 0.144 to 0.653. On the other hand, the correlations between testlet factor scores were all estimated to be negative across all simulation conditions. The magnitudes ranged from -0.451 to -0.110 for the conventional two-parameter bi-factor testlet IRT model, while they were from -0.993 to -0.021 for the modified two-parameter bi-factor testlet IRT model. It was evident that the correlations between testlet factor scores were different from the correlations between subscale testlet raw scores. Our results indicated that absolute values of the magnitudes from subscale testlet raw scores and

conventional two-parameter bi-factor testlet IRT model were similar to each other. However, the absolute values of magnitudes from modified two-parameter bi-factor testlet IRT model were much higher. On the other hand, the correlations between subscale testlet raw scores and total testlet raw scores were in the range of 0.637 to 0.901, while the correlations between testlet factor scores and general factor scores were all positive, ranging 0.006 to 0.611. It was evident that testlet factor scores correlated with general factor scores much lower than testlet raw scores did. It is quite evident that testlet factor scores themselves are not appropriate to be used as subscale scores to represent performance on testlets.

Given the correlations between testlet raw scores as the base line, our results raised a question why the correlations between testlet factor scores and general factor scores were quite different from the correlations between testlet raw scores. Another question is whether we can use testlet factor scores or general factor scores as trait level estimates. It is speculated that either testlet factor scores or general factor scores may be affected by negative correlations between testlet factor scores. The correlations between subscale testlet raw scores were all positive, and the correlations between subscale testlet raw scores and total testlet raw scores were high. On the other hand, since the correlations between testlet factor scores were all negative, the correlations between testlet factor scores and general factor scores turned out to be much lower. It is evident that general factor scores may not be affected by negative testlet factor scores correlations. On the other hand, it is quite clear that testlet factor scores are affected from negative testlet factor scores correlations. For this reason, a question is; does it make sense to use testlet factor scores as the testlet subscale scores itself? Our results indicated that it does not make sense at all, simply because in reality the correlations between testlet factor scores should behave like correlations between testlet raw scores. Our concern is that having negative correlations between testlet factor scores may affect any interpretations based on testlet model. Also, if testlet factor scores are used as testlet subscale scores, it would raise a question regarding their validity.

We also investigated a linear combination of a general factor score and a testlet factor score as the testlet subscale score. Our investigation demonstrated that the correlations between the linear combination and general factor scores were all positive in the range of 0.844 to 1.000. These results were much more reasonable than the correlations between testlet factor scores themselves and general factor scores. This may be an indication that a use of a linear combination of the general factor scores and testlet factor scores as the testlet subscale scores may make sense. However, correlations between the linear combination and the general factor scores were slightly higher than we expected. Our anticipation was that they would appear close to the correlations between subscale testlet raw scores and total testlet raw scores.

Randomly sampled real data set from a reading comprehension testlet items was also evaluated. The correlations between subscale testlet raw scores were all positive in the range of 0.434 to 0.654. On the other hand, the correlations between testlet factor scores were all negative ranging from -0.313 to -0.069 by the conventional two-parameter bi-factor testlet model, while they were -0.826 to -0.076 by the modified two-parameter bi-factor testlet model. The correlations between subscale testlet raw scores and total testlet raw scores were in the range of 0.757 to 0.850, whereas the correlations between testlet factor scores and general factor scores were in the range of 0.003 to 0.159. Also, the correlations between the linear combination and general factor

scores were all positive in the range of 0.921 to 0.989. Overall, it was confirmed that results from the analysis of the real data displayed similar patterns to the simulated data analysis.

Regarding effect of simulation factors, our investigation demonstrated that the magnitudes of the correlations between subscale testlet raw scores, as well as the correlations between subscale testlet raw scores and total testlet raw scores, became larger when the item discrimination was larger. It is not surprising because the 2PL ability estimates are weighted by item discrimination. On the other hand, the correlations between a linear combination of the general factor scores and testlet factor scores and the general factor scores became smaller when testlet effect was larger. Since testlet effect affects the probability of each individual answers each item correctly, when testlet effect is small, the variation between individuals would be very small. In this case, the correlations between the linear combination and the general factor scores would likely behave similar to the correlations between general factor scores, which should be very high. On the other hand, when testlet effect is larger, the variation between individuals would be larger. Therefore, a linear combination of general factor scores and testlet factor scores was likely affected by the testlet effect.

### Summary and Recommendation

This paper investigated how testlet factor scores and ability estimates were correlated each other under two bi-factor testlet IRT model specifications though a simulation study and real data from a reading comprehension test. First, the results showed that the correlation between testlet factor scores from two testlets were uniformly negative. This was contrary to positive correlation between testlet-level observed total scores. Second, it was found that the correlations between testlet factor scores and ability estimates were positive. However, the magnitude of the correlations were uniformly smaller than the correlations between testlet-level observed total scores and the test-level observed total scores. Lastly, the sum of ability score and testlet factor score correlated highly with the ability score. This may be an indication that a use of a linear combination of the general factor scores and testlet factor scores as the testlet subscale scores may make sense. However, further investigation is warranted.

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**Table 1** Correlations between subscale testlet raw scores and correlations between subscale testlet raw scores and total testlet raw scores

Condition	AB	AC	BC	AT	BT	CT
1	0.201	0.230	0.207	0.688	0.682	0.698
2	0.271	0.232	0.229	0.696	0.722	0.695
3	0.653	0.505	0.595	0.842	0.898	0.809
4	0.646	0.528	0.640	0.835	0.901	0.837
5	0.186	0.212	0.269	0.678	0.707	0.696
6	0.246	0.294	0.227	0.729	0.689	0.712
7	0.591	0.483	0.583	0.813	0.882	0.817
8	0.574	0.489	0.620	0.806	0.883	0.832
9	0.180	0.161	0.239	0.637	0.710	0.691
10	0.203	0.144	0.181	0.667	0.701	0.646
11	0.438	0.454	0.425	0.786	0.801	0.786
12	0.449	0.389	0.441	0.768	0.818	0.770

Note. AB = correlations between subscale testlet A raw scores and subscale testlet B raw scores, AC = correlations between subscale testlet A raw scores and subscale testlet C raw scores, BC = correlations between subscale testlet B raw scores and subscale testlet C raw scores, AT = correlations between subscale testlet A raw scores and total testlet raw scores, BT = correlations between subscale testlet B raw scores and total testlet raw scores, and CT = correlations between subscale testlet C raw scores and total testlet raw scores.

**Table 1** (continued) Correlations between testlet factor scores and correlations between testlet factor scores and general factor scores

Condition	Conventional bi-factor model						Modified bi-factor model					
	FA.FB	FA.FC	FB.FC	FA.FG	FB.FG	FC.FG	FA.FB	FA.FC	FB.FC	FA.FG	FB.FG	FC.FG
1	-0.187	-0.208	-0.170	0.473	0.384	0.504	-0.771	-0.274	-0.216	0.184	0.125	0.280
2	-0.200	-0.171	-0.233	0.421	0.502	0.440	-0.369	-0.605	-0.858	0.197	0.155	0.220
3	-0.412	-0.257	-0.451	0.286	0.313	0.260	-0.422	-0.390	-0.508	0.637	0.430	0.313
4	-0.420	-0.291	-0.440	0.262	0.293	0.271	-0.170	-0.368	-0.121	0.396	0.482	0.415
5	-0.176	-0.139	-0.220	0.329	0.533	0.503	-0.991	-0.993	-0.990	0.079	0.033	0.025
6	-0.216	-0.253	-0.185	0.496	0.356	0.439	-0.581	-0.383	-0.365	0.242	0.116	0.210
7	-0.406	-0.275	-0.433	0.260	0.331	0.276	-0.469	-0.583	-0.358	0.102	0.174	0.131
8	-0.380	-0.273	-0.468	0.238	0.318	0.300	-0.779	-0.765	-0.327	0.101	0.185	0.178
9	-0.149	-0.148	-0.264	0.320	0.530	0.489	-0.171	-0.344	-0.714	0.050	0.261	0.265
10	-0.202	-0.110	-0.174	0.421	0.611	0.361	-0.524	-0.594	-0.323	0.086	0.155	0.070
11	-0.300	-0.384	-0.280	0.395	0.258	0.371	-0.553	-0.190	-0.712	0.007	0.027	0.006
12	-0.341	-0.289	-0.321	0.352	0.358	0.337	-0.166	-0.355	-0.737	0.324	0.345	0.257

Note. FA.FB = correlations between testlet A factor scores and testlet B factor scores, FA.FC = correlations between testlet A factor scores and testlet C factor scores, FB.FC = correlations between testlet B factor scores and testlet C factor scores, FA.FG = correlations between testlet A factor scores and general factor scores, FB.FG = correlations between testlet B factor scores and general factor scores, and FC.FG = correlations between testlet C factor scores and general factor scores.

**Table 2** Correlations between a linear combination of general factor scores and testlet factor scores and general factor scores

Condition	Conventional bi-factor model			Modified bi-factor model		
	(FG+FA).FG	(FG+FB).FG	(FG+FC).FG	(FG+FA).FG	(FG+FB).FG	(FG+FC).FG
1	0.998	0.996	0.999	0.995	0.992	0.999
2	1.000	0.998	0.970	0.999	0.993	0.984
3	1.000	1.000	0.999	1.000	1.000	0.999
4	1.000	1.000	1.000	1.000	1.000	1.000
5	0.857	1.000	1.000	0.931	0.975	0.987
6	0.998	0.996	0.998	0.997	0.994	0.997
7	0.990	0.997	0.993	0.991	0.995	0.993
8	0.982	0.999	0.999	0.989	0.997	0.997
9	0.999	0.998	0.996	0.998	0.996	0.994
10	0.910	0.986	0.885	0.933	0.960	0.906
11	0.981	0.878	0.968	0.961	0.913	0.958
12	0.945	0.936	0.934	0.844	0.976	0.919

Note. (FG+FA).FG = correlations between a linear combination of general factor scores and testlet A factor scores and general factor scores, (FG+FB).FG = correlations between a linear combination of general factor scores and testlet B factor scores and general factor scores, and (FG+FC).FG =

correlations between a linear combination of general factor scores and testlet C factor scores and general factor scores.



## **DEVELOPMENT OF FACILITATE SKILL THE RAJAMANGALA UNIVERSITY OF TECHNOLOGY LANNA TEACHER TO SUPPORT IMPLEMENTATION OF WORK INTEGRATED LEARNING.**

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### **ABSTRACT**

This paper presents a framework for development Soft Skill for facilitators include 3 main principles. 1) Training Workshop Facilitator to develop a way to set the dialogue with the team's trainers of King Mongkut's University of Technology Thonburi (KMUTT) 2) Practicing with the dialogue with the students, 3) To reflect the learning facilitator of learning through writing notes on Facebook. Such methods have been applied to the facilitators of the course WiL from Siam Michelin Group's four people. Tools used in research reflect the knowledge and skills to act as Facilitator.

The work includes the evaluation Soft Skill. The research found that The framework for the development of the above helps facilitators have developed Soft Skill 7 areas Teamwork, Leadership, Listening Understanding and Responding, Production Knowledge, Written Communication, Conceptual Thinking and Dialogue throw the facilitators of the importance of adopting dialogue to the point in the development of teaching and learning in the course of their responsibility. And project management WiL-Michelin Siam student attitude. Positive learning information for project updates to achieve the objectives of the project.

**Keywords:** Facilitators, Work Integrated Learning, Soft Skills

### **Introduction**

Year 2013 Office of the Vocational Education Commission (VEC) collaborates National Science Technology and Innovation Policy Office (SITI) Rajamangala University of Technology Lanna (RMUTL) and Michelin Siam Co., Ltd. Project Management Collaboration instruction integrated with the work. (Work-integrated Learning : WiL) Production Manpower Development Diploma in Industrial Technique has a duration of five years. The objective is to develop scientific manpower technology between enterprises and educational institutions. A much stronger lead productive manpower level technicians and technology to meet the quality requirements of the

industry. Prototyping and development of manpower level technicians. The technology and quality of vocational education in a broad following.

Management Courses WiL (Vichit Srisaarn, 2009) The experiential learning directly from the students to apply the knowledge learned in class institution. To the actual operation of the establishment. As a tool for development enhancing the quality of student graduates and graduates to be able to meet the needs of the labor market by allowing students. The teachers in the program must adjust its role as a provider of knowledge is facilitators which serves to promote and encourage student learning. Soft skills consultancy working in the care industry. And is responsible for the well-being of the student so. He has participated in the development of Soft Skill for teachers. (Facilitators) in WiL-Michelin To feature a facilitator and operational duties effectively.

#### **Concept Work-integrated Learning: WiL.**

WiL (Office of the Education Council, 2009) is a study that focuses on training students to work on real performances by professional (vocational competency). Establishments, with a philosophy like that. "To highlight the fact that real and true" educational format. We need co-operation with third parties, professional associations, educational establishments, which use the concept in collaboration with personnel outside the school. Started operation since 1906 at the University of Cincinnati's (University of Cincinnati). United States to resolve the issues, concepts and professional skills of the students can't be taught effectively in the classroom. As well as working part-time student during class is not inconsistent with the quality and professional goals. (Knowles, 1981) WiL is a case study of the learning experience (Experience Learning) that gives students an opportunity to apply the knowledge. Work Skills Professional skills and learning Using real-life work before graduation. WiL-Michelin Siam to form a six-operative Education (Cooperative Education) course management education while attending school. Between schools and enterprises. To link knowledge with practical experience The selection of students qualified to study and practical training in the factory. Students have been working as an employee in a factory called "factory schools". Learning Facilitator and theoretical knowledge from the teacher from teaching RMUTL least six days a week. The factory of Siam Michelin. Laem Chabang and Rayong as a place to study and learn. Experts in plant closely. The role of Siam Michelin is co-determined criteria to evaluate. To increase and specialization to meet the needs of the industry. It also provides support for scholarships, salary, welfare and accommodation until graduation.

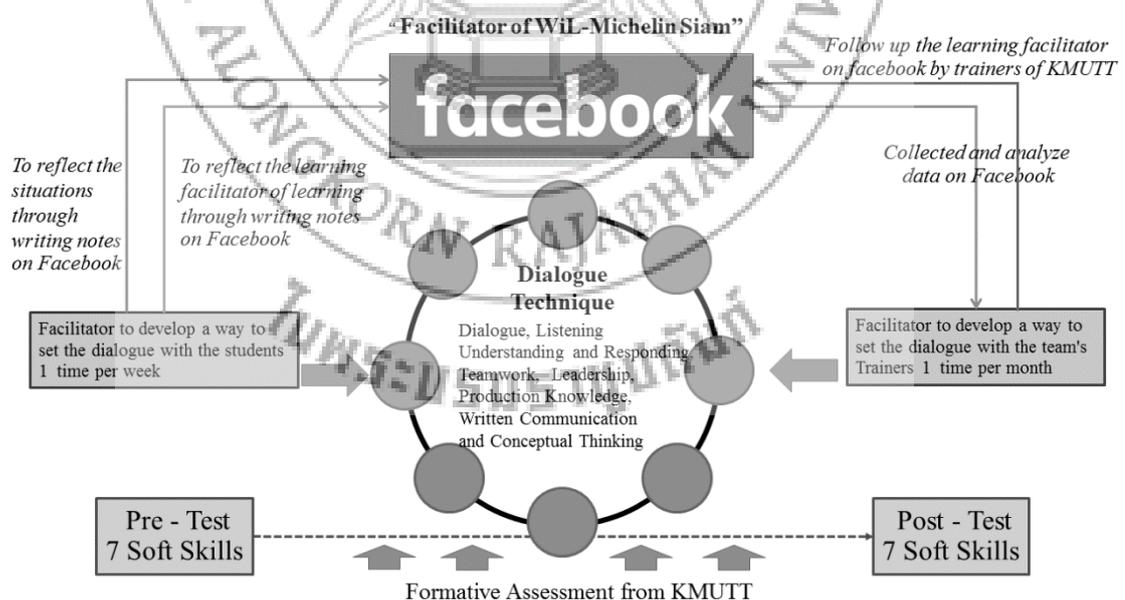
### Project Facilitator Role

The role of the facilitator concept of Roger (1994) as a concept and the importance of facilitating learning. It is believed that all people can develop themselves and to manage their own lives. Has the potential to learn from the man. To the mind of the individual human being. And has offered the instruction that focuses on learner-centered (student- centered teaching) the role of facilitator in WiL-Michelin Siam are as follows:

- The theory taught in the course curriculum.
- Building support and encourage the learning of students.
- Take care and be responsible for the lives and safety of students.
- Consulting work in industry for students.
- Promotion and Evaluation Soft skills of students.
- Co-operate course between students with an industries advisor and teacher's curriculum

### A Framework for Development Soft Skill for Facilitators

Development Facilitator in WiL - Michelin Siam, where students have to live in schools and factories. Teachers will be responsible for the student as a family. And provide opportunities for students to learn on their own independently. We have designed a training program based on the concept of learning from experience. (Experiential Learning), as shown in the picture. Soft Skill development framework for facilitators comprising 3 main principles.



### Research Objectives

1. To follow up the progression of developing soft skill for facilitators.

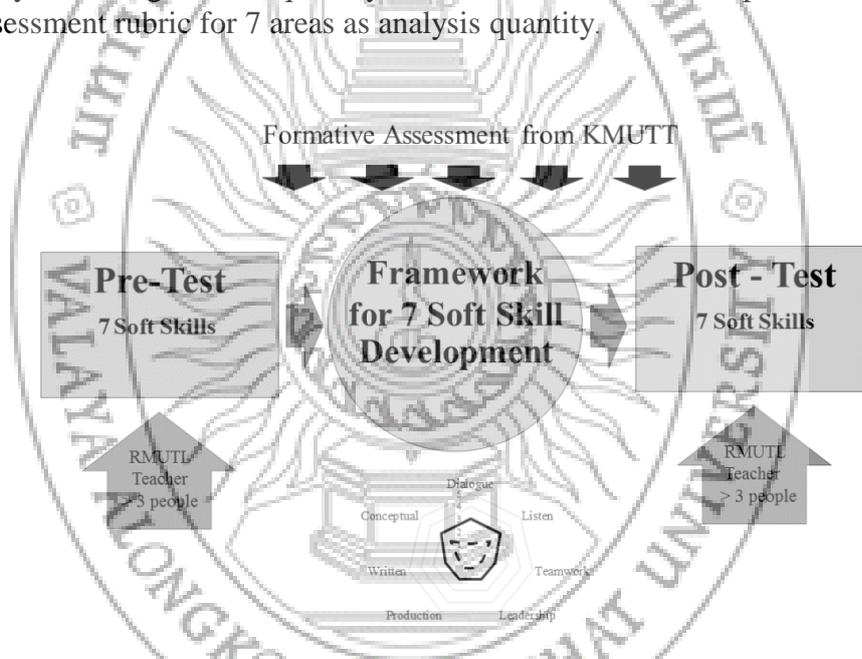
### Sample Group

Facilitator in WiL - Michelin Siam 4 people.

### Methodology

Developing Soft Skill for Facilitator of WiL-Michelin Siam as follows

1. Developing framework idea of soft skill for facilitators and determine score (Rubric) soft skill 7 areas after that collecting score in a group of working of SITI and RMUTL for considering and adjustment for advise.
2. Evaluating Soft Skill for 7 areas of facilitators before and after finish the project by collecting statistic quantity from lecturer RMUTL of 3 persons by using soft skill assessment rubric for 7 areas as analysis quantity.



3. Developing soft skill to teachers WiL-Michelin through way of a work-shop group of conversation by Dialogue for one time per month by team of lecturer from KMUTT who are in charge for seminar operating since June 2016 after participating the activity. Teachers Will collect quality data which has followed up the progression from learning record which matter to reflection issue and present environment the dialogue of teacher via facebook while lecturer from KMUTT Will analyze and feed back to teacher for developing soft skill for 7 areas following the objective set

4. Data Analysis are 2 type

- Information date details such as observation data during the seminar, learning record, reflection result and environment dialogue of teacher on facebook that bring up data from tools of analysis quality resource to analyze by division and data system record, analytic induction

- Quantity Data such as scoring from evaluation from 7 areas that bring up statistic basis and education comparison data each time that present out into Radar Chart

### Results

1. Collecting data from idea framework for developing soft skill for facilitators are facts of procedure of each parties as following

1.1 Training Workshop Facilitator to develop a way to set the dialogue with the speaker KMUTT. Soft Skill development for teachers WiL - Michelin Siam passed a workshop dialogue group 1 time per month by a team of trainers of KMUTT

- 1<sup>st</sup> The first learning planning, learning and practicing the conversation by dialogue as Facilitator two events are the activities and demonstrations. Observers topics as mentors to students WiL- Michelin Siam lecturer leading the dialogue. Talk and act as facilitators, participants were divided into three dialogue on the strengths, weaknesses and recommendations. The activity of coaching, leadership, dialogue topics include balancing work and life.

From workshop seminar 1<sup>st</sup> time during the attendees designed the activities to apply skill with students found that the attendees in seminar can think of mainly issue for a group dialogue correctly and during the real practice to lead dialogue so the attendees can conclude the point and capture priority then write it on the flip chart and underlines an important word into the answer of a group dialogue workshop but questioning for leading it to a main point to use it as dialogue still using question end close with Yes , No. So, Lecture 's KMUTT then added questioning technique by asking question with Bloom's Taxonomy of Questions for helping develop thought in high level of participants in dialogue.

- 2<sup>nd</sup> The second track is found teachers have begun to put their skills dialogue through the process of learning to the students at least one time each speaker has served as lessons. And provide feedback to teachers. After lecturer, teacher planning discussions to resolve such challenges. The dialogue with the supervisor. Invite the students to drink alcohol.

From workshop seminar 2<sup>nd</sup> time, facilitator for dialogue to reflect the adoption process to the students that the facilitator can make the dialogue progresses to end and it is effective. It should be about a student's participation in the dialogue because some students are not involved in the review opinion. Therefore, KMUTT advise to facilitator to set up a dialogue group of persons for 8-10 and add participating technique to get majority point which is motivation experience individually or several of samples to share and questioning that able to bring up motivation to participants to open up their opinion. Example real experience spoke to students ever heard or ever face events which is similar so sharing is required to others to hear conclusion for new idea.

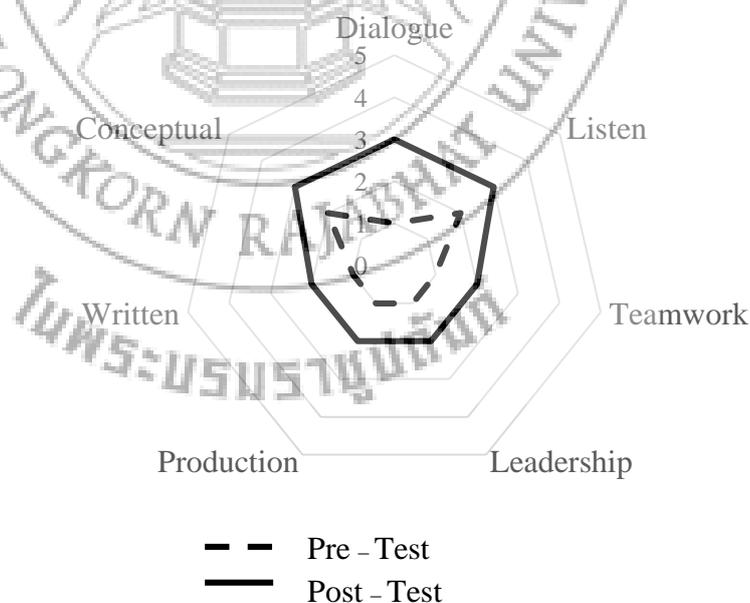
1.2 Practicing with the dialogue with students. Facilitators need to bring the band to a dialogue event with students in the project. At least one time per month to set the point in the development of teaching and learning in the course of their responsibility. And project management WiL-Michelin Siam.

Dialogue Practice Workshop with students has developing result soft skill from teachers in second time that teacher start to realize that bringing skill of facilitator by doing the dialogue group workshop is good used and response with students in term of studying mathematics and evaluation of project WiL- Michelin Siam set up activities which help students attitude that lead information to improve the project and also teacher can apply using it continually so developing of soft skill can be effective for students by RMUTL's lecturer must be participated and encourage facilitator in process with dialogue use.

1.3 To reflect the learning facilitator of learning through writing notes on facebook. After the facilitator led a group discussion dialogue activities to be carried out with the students and facilitator of learning to write. On Facebook to share their learning with the lecturer.

Reflection learning of facilitator through journal writing, learning on facebook found that facilitator can write notes to learn about bringing dialogue to the students and lecturers KMUTT monitor and advise through facebook in the first period. Content for facilitator writes to tell the group meetings with students to inform various speakers to KMUTT. We have advised to try design issues that can make students have participated in the review, the facilitator should observe the behavior and the mood of the students as a teacher while dialogue via facebook.

2. Tracking the progress of the development of soft skill of facilitators show that facilitator is trained to act as facilitator of soft skill has performing increased by considering each aspect found.



2.1 *Dialogue* for pre seminar of facilitator can use the dialogue in the basic level which can handle issues that matter to them but the question that still started a closed-ended questions when the second trained times passed for facilitators Will be

developed in level of doing so the process can continue in a group dialogue until the end and efficiently but It should be a point related to student's participation in the dialogue.

2.2 *Listening Understanding and Responding* before training of facilitators are listening understanding and responding skill in level of Doing has a behavior that expresses the understanding and compassionate people. Both internal and external, can listen to the opinions of others who are different from themselves and know and understand that the situation should be said or what circumstances should be a listener.

When the two trained times passed for facilitators then was developed in level of Developing which has the ability to analyze the source or cause of the problem. Including the effect on other units, there are techniques to make others listen to the opinions of various solutions. From teammates and trying to find a conclusion to solve the problems. formed by others

2.3 *Teamwork* before training for facilitators contains teamwork skill levels Basic, it can recognize and understand the roles and responsibilities of their own. Attendees team to realize the goals and progress of the work. Participating teams or activities are held. and operational goals. Once trained two times of facilitator in the development of level doing. Behavior, participation is the mission of the team, helping members to work to achieve the goals of the team, motivate team members to exchange ideas with each other and propose alternative approaches to solve the problems of the team members.

2.4 *Leadership* before training of facilitators have leadership skill levels Basic, can prioritize and process by their own, self-management to be successfully meet the goals set, expresses acceptance of the opinions of others and knowledge of methods and techniques to reward achievements of team members. Once trained facilitators passed second times the developing in behavior level doing participation in the development plans of the team, a conclusion to the problems arising from brainstorming with the team members assess the situation and identify ways to resolve the situation and ensure that equality in what happened to the team members.

2.5 *Production Knowledge* before the training for facilitators contains production knowledge in basic level can clarify the concepts, principles, procedures and working methods in the production of their responsibilities, explain the scope of duties and responsibilities in their work and to seek opportunities to further their additional education for their job responsibilities once trained two times. when facilitators in the development of doing can provide information to others about the process and how to mainly work for production, support team members and explain the data which involve the production related to the others and advises team members on the process and how it should perform their operation.

2.6 *Written Communication* before training facilitators have written communication skills in basic level documentation and correspondence to communicate truthful information to team members, writing grammatically complete sentences and spell words correctly. And document formats That used to fit the job

description. Once trained two times. Doing development facilitators in documentation or correspondence, to communicate information to people at different levels, detailed information on the distribution and presentation of information in the form of graphics. Write and review their reasonableness.

*2.7 Conceptual Thinking* before training facilitators are conceptual thinking in doing the knowledge and understanding of the causes and consequences of problems with team members, determine their own work in a systematic, presentation, or frameworks. solutions to problems on their own and others and seek feedback from others about their views. The two trained facilitators was developed in Developing a core idea or framework for planning the work for the team members, an overview of the work of the agency. The desired result and issues that may occur if not immediately addressed and explained that team members understand the linkage of strategy at the corporate level of the agency system.

### **Discussion and Conclusion**

1. The development of a framework for the development of Soft Skills facilitators. The development concept for the development of soft skills in project facilitator WiL - Michelin Siam paradigm can be served on the faculty as a Facilitator. Make teachers aware of the Facilitator features that are essential to the learning of the students in the project. Some events allow teachers to learn about the process and learn differently. Which can be used to supervise. And learning to learn such activities questioned by Bloom's Taxonomy, Ice breaker activities, the dialogue with the students, the course design, training should be planned in conjunction with Siam Michelin Group to identify the characteristics of the facilitators on the project. hopefully it Will help the project. Achieve the objectives set

2. Soft Skills for facilitators of WiL-Michelin Siam. The participants are soft skill of acting facilitator 7 areas are Dialogue, Listening Understanding and Responding, Teamwork, Leadership, Production Knowledge, Written Communication and Conceptual Thinking by facilitators skilled rising on all sides. This is because there has been a process and framework development facilitator of learning activities in which participants can share their experiences and to learn from the knowledge. Learning experience Brainstorm reflect the opinions of the teaching practice. And participation guidelines. Including training methods focus on learning from practice. This is consistent with the basic principles of management training so that adults learn better. There needs to be analyzed (Needs Assessment) Create an atmosphere of safety (Safety) create a good relationship between the trainer and the trainees. Building and operating A reflection (Reflect) learning by doing (Learning by Doing) create a clear role (Clear Roles). Learning to work together as a group (Teamwork) by a small group to help each other. Feeling safe Look to help each other as well as help create a bond between the participants on what they have learned (Engagement) (Vella, 1994).

### Research suggestions

1. This research paper presents a framework for the development of soft skills that necessary to act as a facilitator to bring to trial the WiL facilitators who work on other projects. To ensure more also needs to gather more confidence as well as the advantages and drawbacks need to improve and more clarify about it.

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## **DEVELOPMENT OF SELF-INSTRUCTION THROUGH ONLINE LEARNING ON TEACHING SKILL FOR INDUSTRIAL EDUCATION**

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### **ABSTRACT**

The research aims were 1) to develop and find out the efficiency of the self-instruction through online learning on teaching skill for industrial education in accordance with defined 80/80 criteria, 2) to compare the learners' achievement learning who studied with the self-instruction through online learning on teaching skill for industrial education and conventional method, 3) to find out the learner' attitudes towards the program. The experiment was conducted with a sample group of 40 learners who registered on teaching skill in the first semester in the academic year 2015 Department of Industrial Education at Rajamangala University of Technology Suvarnabhumi. The experiment group studied with the self-instruction through online learning on teaching skill for industrial education and control group studied with a tradition method. For Instruments of the study were as following 1) the self-instruction through online learning on teaching skill for industrial education, 2) The learners' achievement tests, and 3) Questionnaires. Statistics were analyzed by using mean, standard deviation and t-test. The results of the study showed that efficiency of the self-instruction through online learning on teaching skill for industrial education was 83.33/82.90 which was higher than the specified criteria of 80/80. The learning effectiveness of experiment group was higher than the control group in the level of statistical significant at .05 level, and the learners revealed that the learner' attitudes towards were good the program.

**Keywords:** self-instruction, teaching skill, industrial education

### **Introduction**

According to the 1999 National Education Act, where it is stated that the trend of education management must hold the premise that all learns have the ability to learn, and to improve themselves. It is believed that learners are central. It is also stated that learners should have enough knowledge and skills in using educational technology to search for knowledge for lifelong learning (The Bureau of National Education Committees, 1999). In the age of education reform, there is awareness of the importance of educational technology in the learning achievement to Thai students. Furthermore, to change learning and teaching process into a child-centered approach, educational technology should be used extensively in learning and teaching (Chullachart, 2002).

Teaching skills are strategies teachers use to enable children to learn something 'worthwhile' like facts, skills, values, concepts how to live harmoniously with ones fellows, attitudes or some other outcomes thought to be desirable. Also a skill has to be acknowledged by those competent to judge like teachers, teacher trainers, inspectors

and learners themselves. The skill is also such that it can be repeated. It may not be in the same form but it is frequent rather than a chance occurrence. In classroom teaching, the teacher generally uses skill set induction, presentation, question, reinforcement, set closure, stimulation, use of black-board, active thinking, and media presentation. (Jessie S. 2008).

The literature related to this topic demonstrates that all the academic institutions as well as implement field that Isman, A (2012) to determine the effectiveness of using blended learning approach in developing student teachers skills, and defining teaching skill that confront students of teachers college at King Saud University need it. [F. Haddadian](#) (2012) to examine the effect of self-instruction technique on improvement of reading performance and reduction of anxiety symptoms in primary school students with dyslexia in city of Arak in academic year. Rita kupetz and Birgit Aiegenmeyer (2005) discusses a blended learning concept for a university teacher train course for prospective teachers of English integrated interactive e-learning and contact learning. Iola Peed (2003) says that computing and information technology centers, and distance learning centers provide teachers and students with access to, and training in, the use of instructional technology. These centers also need to learn to provide meaningful advice on the utility and feasibility of serving specific instructional needs with current services, not generic instructions about the use of their too, also states that “If teaching centers, technology centers, and faculty and students work together in this way, we will be able to identify which technology systems work best for instruction (on- and off-campus), which of the available tools to use, what new tools are needed, where the best resources are, and what factors advance (or hinder) our work”.

The study is an attempt to provide a meaningful and practical on teaching skill for technical teachers who registered industrial education in subject. Therefore, the study aims to develop the self-instruction through online learning, in order to help learners improve the teaching skill, and find out the learner’ attitudes towards the program at Rajamangala University of Technology Suvarnabhumi.

#### Research Objectives

1. To develop and find out the efficiency of the self-instruction through online learning on teaching skill for industrial education in accordance with defined 80/80 criteria,
2. To compare the learners’ achievement learning who studied with the self-instruction through online learning on teaching skill for industrial education and conventional method.
3. To find out the learner’ attitudes towards the program

### Methodology

The present study was a quasi-experimental design. The study included two groups: the control and the experimental group. An experimental group using self-instruction through online learning and control group learning, through conventional way of teacher directed instruction.

The treatment was designed to last eight weeks. With the help of the class performance records the lecturer was able to know the learners who have learning difficulty and need more practical in teaching skill. The first administer to all the learners in class and records the scores obtained by pre-test, and then the lecturer carried out the each lessons for the study. The experimental group learnt by the self-instruction through online learning and the control group learnt the conventional method

#### *Population and Sample of the Study*

The sample for the study was 40 learners who registered on teaching skill in the first semester in the academic year 2015 under the Department of Industrial Education at Rajamangala University of Technology Suvarnabhumi.

#### *Instrument of the study*

1. Self-Instruction through online learning on teaching skill for industrial education was conducted, and next the step of construction and efficiency evaluation.
2. The learner's achievement test for equivalent groups design: a control group and an experimental group
3. Attitude questionnaire find out the learner's attitude toward the self-instruction through online learning on teaching skill for industrial education

### Research Results

**Table 1:** Result of the self-instruction through online learning on teaching skill for industrial education

<b>Trial steps</b>	Efficiency of process (E <sub>1</sub> )	Efficiency of result (E <sub>2</sub> )
Individual	76.00	65.54
A small group	80.20	76.80
Field group	83.33	82.90

The results of the three trials shown that the efficiency index of the self-instruction through online learning for teaching skill for industrial education of the field group trial was 83.33/82.90 after the individual trial and the small group trial.

**Table 2:** Results of compare the learners' achievement learning who studied the self-instruction though online learning on teaching skill for industrial education and convention method,

Items	Pre-test				Post-test				t-value
	n	mean	S.D	Std.Error mean	N	mean	S.D	Std.Error mean	
Experimental group	20	11.30	2.638	0.590	20	18.15	1.82	0.264	8.00
Control group	20	10.70	1.867	0.417	20	16.55	1.986	0.444	

*p* < .05

The results in Table showed the improvement in the mean scores of the experimental group and the control group. The experimental group was administered self-instruction through online learning. The control group was instructed through the conventional method. An experimental group improve from the pre-test mean score (11.30) to the post-test mean score (18.15). A control group improve from the pre-test mean score (10.70) to the post-test mean score (16.55).

Result of the learner' attitudes towards the self-instruction through online learning on teaching skill for industrial education demonstrated that learners had good attitudes toward learning by self-instruction through online learning ( $\bar{x} = 4.00$ ). Considering for each item, it was revealed that learners thought that teaching skill classroom through the self-instruction through online learning was interesting ( $\bar{x} = 4.20$ ). They enjoyed learning the self-instruction through online learning on teaching skill ( $\bar{x} = 4.20$ ), and they also agreed that learning by the self-instruction through online learning on teaching skill help them understand ( $\bar{x} = 4.00$ ). The learners also greed that learning the self-instruction through online learning on teaching skill for industrial education was easy ( $\bar{x} = 4.15$ ) and they did get comfortable ( $\bar{x} = 3.88$ ).

### Summary and Recommendation

1. The efficiency of the self-instruction through online learning for practical teaching skill for industrial education was 83.33/82.90, which met the prescribed criterion 80/80 level. The finding of this study is also in agreement with the finding of Sarunya (2013) that online tutorials on quality assurance of higher education were qualified in the standard level, and also Nikon (2014) that the online learning by using the Gagne's process skill teaching Model 9 steps in Information Technology subject for students had an efficiency of 80/80 which was on established requirement.

2. The learning achievement of learners in the experimental group was higher than those of learners in the control group with statistically significant differences at .05. It is evident that there is additional improvement in the performance of the experimental group. This leads to the conclusion of the study that learners are enabled to learn on their own at their own pace, at their own convenience with as many repetitions, as many backward and forward movement and for practice, for exercises and for self-improvement through the multimedia instruction technology media. The finding of this study is also in agreement with the finding of Wehemeyer (2006) that self-instruction strategy enhanced the performance of the students in mathematics. Also, the finding of the study is in line with the opinion of Reed and Giessler (1995) that self-instruction

engenders self-regulation and self-regulation has been viewed as a desirable quality throughout history because of its positive effects on behavior and the achievement of low performing students, Hughes and Carter (2000) affirmed that self-instruction strategy has the purpose of stimulating, actively supporting and facilitating the internal process of learning.

3. The learners had good attitude toward learning through the self-instruction through online learning on teaching skill for industrial education. The experimental method used self-instruction through online learning as type of practical skill on the subject shows potential as a format, explain, flexible, and dynamic technique. This corresponded to Bongkot (2002) who stated that the attitude toward in class was generally positive.

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## **A TEACHING EVALUATION OF PRE-SERVICE TEACHER STUDENTS IN BIOLOGY MAJOR IN EDUCATION PROGRAM OF RAJABHAT MAHASARAKHAM UNIVERSITY**

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### **ABSTRACT**

The purpose of this research was to examine opinion of university's schools network toward pre-service teacher students in Biology major. To examine six aspects of comments and suggestions from schools that accepted pre-service teacher students such as 1) Kind, empathy, and positive towards students 2) Patient and responsible 3) Act as learning person and academic leader 4) Visionary 5) Faith in teaching profession and 6) Adhere to teacher professional ethics. The samples group consisted of 98 advisors in 98 network schools that had 103 teacher students in the second semester of the academic year 2015 majoring in Biology at Faculty of Education, Rajabhat Maharakham University. The research instrument was 5-rating scale questionnaires for mentor teachers. The statistics used in analyzing data for this research were mean and standard deviation. The overall evaluation results showed that all components were rated at the highest level.

**KEYWORDS :** Practicum Outcome, Advisors, Pre-service, Teacher Student, Biology major

### **Introduction**

Education is a means for human to develop quality of their lives and enable them to live their lives in the society peacefully. This becomes the strong scaffolding mechanism for the country's development that promotes appropriate advancement and accommodating capacity for the country against any emerging changes. Education development including both formal and non-formal system as well as technological driven system still needs teachers to serve as important mechanism for teaching and learning because the society still requires role model student on morality, ethics, and personality in which technology cannot offer. In the past, Education in Thailand relies on temples to serve as a hub disseminating knowledge to the community. So, personality of traditional teachers is comparatively to that of the monks who strictly follow precise morality disciplines, obey Lord Buddha's teaching, and act as good role model for their disciples. In addition, teachers play important role as education provider and they direct future of the nation. If the nation has many great teachers who are expertise in their jobs, generous, and highly devoted for benefits of students, that nation will have competent and smart population as the population has potential and capacity to compete with any nation globally. In this regard, teachers must be knowledgeable, competent, highly skilled, and true consciousness in their teaching professional so that they can perform teaching career with pride and honor, and they can become good

example for their disciples to follow and take into account as the role model in living their lives.

Therefore, teachers hold key function in developing every aspect of the student's learning. Thailand also recognize the importance of teachers as it can be clearly seen from Thailand Constitution B.E. 2540 section 81 that places an emphasis on developing teaching profession and education reform by legislating the law on national education and national education act B.E. 2542 section 52 that mandated Ministry of Education to develop teacher and education personnel production and development system to have quality and meet standards of advanced professional that encourages readiness and strengths in recruiting new personnel and developing the permanent staff consistently. Section 53 prescribes establishment of teaching professional association, school administrators and educational administration association to function as independent organization under administration of professional council affiliated directly to Ministry of Education. This organization has an authority to develop professional standards, activate or terminate professional license, supervise teacher's performance based on standards and ethics of the career, develop teaching professional as well as school administrators and educational administration practitioners.

The researcher who a teacher is playing important roles in promoting students' to increase their attention to evaluate teacher's competence based on the educational reform framework. So, the findings could be used as informative reflection for the involved organization to realize about this fact for improving teacher's performance. The findings could also serve as guidelines to raise teacher's awareness and realization of their duty in order to become professional teacher based on the true purpose of Thailand Constitution B.E. 2540. Likewise, the findings could be the guidelines for educational management to achieve its purpose as prescribed in National Educational Act B.E. 2542 in order to increase credential and faith that the people expect from those to perform teaching career in the future.

### **Research Objectives**

To examine opinion of university's schools network toward pre-service teacher students in Biology major.

### **Methodology**

The researcher aimed at examining six aspects of comments and suggestions from schools that accepted pre-service teacher students such as

1. Kind, empathy, and positive towards students has 5 indicators
2. Patient and responsible has 5 indicators
3. Act as learning person and academic leader has 5 indicators
4. Visionary has 3 indicators
5. Faith in teaching profession has 5 indicators
6. Adhere to teacher professional ethics has 10 indicators

The population were 98 advisors in 98 network schools that had 103 teacher students in the second semester of the academic year 2015 majoring in Biology at Faculty of Education, Rajabhat Mahasarakham University.

The research instrument was 5-rating scale questionnaire.

5 means attributes of pre-service teacher students receive highest level of positive opinion

4 means attributes of pre-service teacher students receive high level of positive opinion

3 means attributes of pre-service teacher students receive moderate level of positive opinion

2 means attributes of pre-service teacher students receive low level of positive opinion

1 means attributes of pre-service teacher students receive lowest level of positive opinion

The researcher examined completeness of the returned questionnaire and statistically analyzed the data using a computer software.

### Research Results

**Table 1** Responsibility on learning outcome toward individual learning aspects.

Item	Mean	S.D.	Level
<b>1. Kind, empathy, and positive towards students :</b> listen to student's problems and can give advice to students, pay attention to students' questions and their answers, give advice for students on self-development, check student's homework regularly, show student's works in the class	4.70	0.41	Highest
<b>2. Patient and responsible :</b> hard-working, consistent responsible for the assigned jobs, learn to improve performance, know their duty, plan their job well	4.76	0.38	Highest
<b>3. Act as learning person and academic leader :</b> competent in seeking for variety sources of knowledge, use various methods in seeking for knowledge, form questions whenever in doubts, use why and because questions in search for reasoning explanation, read various books to study one topic	4.67	0.42	Highest
<b>4. Visionary :</b> systematically design the lesson plan, always improve and update the teaching materials, use instructional media in teaching and learning	4.74	0.41	Highest
<b>5. Faith in teaching profession :</b> perform the task with full determination, pay attention to public benefits, help each other as teamwork, being a	4.79	0.38	Highest

beloved teacher to students, hold potential as modern age teacher			
<b>Item</b>	<b>Mean</b>	<b>S.D.</b>	<b>Level</b>
<b>6. Adhere to teacher professional ethics : teach all students equally, honestly listen to student's problems and ready to help them, always study content before teaching, teach at full performance for advancement of students, dress politely, cheerful, lively, welcoming personality, speak politely and rationally, accepted by others, sacrifice and devotion for student's and public benefits, behave politely and in accord to good tradition and culture of community, self-confidence in teaching</b>	4.80	0.33	Highest
<b>Total</b>	<b>4.75</b>	<b>0.36</b>	<b>Highest</b>

Summary of demographic information reported by the respondents.

1. There were 10 male and 50 female respondents.
2. There were 2, 15, 22, and 21 respondents whose their age was below 30, 31-40, 41-50, and above 51 years old respectively.
3. There were 25, 33, 2 respondents whose education background was bachelor, master, and Ph.D. respectively.
4. There were 0, 4, 10, and 46 respondents whose position was assistant teacher, expertise teacher level 1, expertise teacher level 2, and expertise teacher level 3 respectively.
5. There were 10, 16, and 34 respondents whose years of teaching experience were below 10 years, 11-20 years, and above 21 respectively.
6. There were 50, 6, and 4 respondents whose years of being mentor were below 10 years, 11-20 years, and above 21 years respectively.

### Summary and Recommendation

The overall evaluation results showed that all components were rated at the highest level which indicated that the pre-service teachers from this university were effective in becoming great teacher in the future.

Pre-service teacher students' satisfactions of planning and proceeding field experience course, and the perception on their practice quantity and their own teacher's characteristics were found at high level of satisfaction. However, during their one-year student teaching experience, pre-service teacher students faced problems in trying to set clear learning outcomes in lesson plans, rarely probing students' prior knowledge or asking questions, classroom management, misconceptions in biology concepts, and conducting classroom action research. Despite the struggles they experienced, pre-service did learn lesson planning techniques, teaching strategies, students' learning, classroom management, and how

to incorporate instructional materials. This study has direct implications for the ways in which we introduce and engage pre-service teacher students into constructivist-based teaching practice in their chosen profession.

### **Acknowledgement**

The authors desire to thank 98 advisors in 98 network schools.

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