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## Editorial Statement

On behalf of the editorial boards of International Journal of Industrial Education and Technology, I would like to welcome and present you the first issue in the International Journal which is published by Faculty of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang. International Journal of Industrial Education and Technology called as IJiet (I-Jiet) is mainly to offer the research contents and articles in the fields of industrial education and technology. IJiet is consisted by three contents which are review article, book review, and research articles, respectively. For this IJiet issue, I would like to encourage you to go through all interesting contents authored by the professional and intelligent group of writers who are volunteers to present and share their outcomes of research and opinions.

As an editor in chief, I would like to sincerely delight to thank you very much for kindly support. If you would like to make us the comments and give us the suggestions regarding on this issue, I would be happy to accept that and make things better.

With best regards,

A handwritten signature in blue ink, appearing to read 'P. Ken', with a stylized flourish above the name.

Assistant Professor Dr. Prasert Kenpankho, D.Eng.  
Editor in Chief

Contents	Page
<b><u>Review Article</u></b>	
A Coaching System to Improve Mathematics Achievement Through Development of Teacher Competencies	1-5
Gantanat Chalong	
<b><u>Book Review</u></b>	
Book Review: The Rebirth of Education Schooling AIN'T Learning Author: LANT PRITCHETT	6-8
Prasert Kenpankho	
<b><u>Research Articles</u></b>	
A Study of Development of a Model of Semi-compulsory Social Security Coverage for Independent Workers	9-18
Suchat Prem Suriya and Jularat Wattana	
A Study of Guidelines on Integration of Services for The Self-insured Persons Through Local Administrative Organizations	19-27
Jularat Wattana and Suchat Prem Suriya	
Agricultural Education Program with Required Competences Through Teaching-Learning Experiences	28-40
Marlowe Aquino and Ratchadakorn Phonpakdee	
An Evaluation of The Desired Characteristics of Students Under The Project of Moral Development in Private School	41-49
Jularat Wattana, Somsuda Pupatana and Thanate Daorungroj	
Blended Learning Management of WordPress Website Development Skill for Communication Design Undergraduates Using The ADDIE Model	50-58
Worapon Yuangngoen, Waristha Saengrith, Nawarat Sitthimongkolchai, Sudarat Makeshine Sirirat Petsangsri and Somkiat Tuntiwongwanich	

Contents	Page
Development of Online Instruction with Problem Based Learning on Introduction to Programming to Promote Analytical Thinking Ability for Undergraduate Students in Computer Education Program	59-66
Sawitree Pipitgool , Nonchai Panjanon and Khunat Phakhaphumphisut	
Innovative Organization of School under The Office of The Basic Education (OBEC): A Second Order Confirmatory Factor Analysis	67-76
Aniruth Boonkua, Ampapan Tantinakornkul and Pariyaporn Tungkunan	
From Contemporary to Post-Quantum Cryptography: System Models, Threats, and Proposed Solutions	77-89
Apirath Limmanee	
The Development of Multimedia on E-Learning with Blended Learning in E-Commerce Lesson for Undergraduate Students	90-97
Nantarat Klinhom, Achah Binheem, Thaksina Noppakhunwong, Sirirat Petsangsri and Somkiat Tuntiwongwanich	
The Enrollment Advantages of Meditation for Life Development Course: A Case Study of King Mongkut's Institute of Technology Ladkrabang Students	98-106
Suwanna Innoi and Ratree Siripant	



# Review Article

## A Coaching System to Improve Mathematics Achievement through Development of Teacher Competencies

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### ABSTRACT

The modern era brings with it increasingly rapid advancements to which societies must adapt. Educational institutions worldwide face great competition and must accept the necessity to adapt and develop in order to meet current standards and needs. Thailand finds itself lagging behind not only western educational systems but also those of its Asian neighbors, many of which have achieved great success on the international stage. Much effort had been directed toward reforming the Thai educational system, but thus far very little progress has been made as these efforts largely fail to address the tendency to dogmatically defer to antiquated, rote philosophies and pedagogy. Customary to the country's professional development of teachers are myriad short-term and one-shot activities lacking in necessary long-term vision and follow-up. More in-depth means of professional development, such as coaching, have not been widespread in their implementation. However, this is not due to any inherent failing in these processes but rather in the perception that they are difficult, or even impossible, to sustainably put into practice. Given a properly designed and, more importantly, properly supported system, coaching can indeed be a means through which institutions can strengthen the direct conduit through which they develop successful students and attain desired standards of performance and achievement, their teachers. Mathematics is regarded as a gateway towards understanding abstract concepts and critical thinking, skills valuable in mastering a number of subjects. Therefore, an effective coaching system coupled with a focus on mathematics can enable teachers to guide students to become more proficient learners. Using such a system, Bangpleepattanasuksalai School in Samutprakan, Thailand, was able to foster notable student achievement in mathematics by devising and putting into practice a coaching system to improve instructional practices and maintain high standards by developing its teachers' competencies.

**Keywords:** coaching, competencies, education, mathematics, professional development, teachers

## INTRODUCTION

The world has transformed into a digital one. Aims and values in education have also shifted accordingly, wherein information itself is not as valuable as the ability to find, process and utilize said information. As such, it is clear that education in Thailand can no longer lean upon memorization and rote learning and that Thai teachers can no longer take it for granted that simply giving students information will lead to success in the real world. This approach fails to engage students' interests and therefore also fails to motivate them to think and reflect about what they are learning, and it is crucial that teachers adopt new approaches and practices (Thailand Development Research Institute, 2012).

### The Importance of Mathematics Proficiency

In order to cultivate their students' ability to think for themselves, teachers must guide them to develop skills in reasoning, planning, analysis and decision-making. Students must not only have knowledge of facts but be able to identify problems and devise their own solutions to them as they will eventually enter a world that will consistently present them with new problems to solve. These are skills and abilities are reinforced by mathematical understanding and practice (Makanong, 2010). Because it bolsters creative and critical thought, mathematical proficiency can also lead greater comprehension of other fields (Jareeyawittayanon & Sriwattanatumma, 1990) so it logically follows that adding focus on students' mathematical skills has great potential to benefit learning in other subjects as well.

### The Benefits of Coaching

The improvement of students' mathematical proficiency not be attainable without development of teachers' competencies in regard to both subject matter and teaching practices. Professional development in Thailand has traditionally consisted of sporadic seminars and workshops catering to transient educational trends. These measures pay lip-service to the need to continually develop teachers' knowledge and skillsets but, being one-shot exercises, lack the time and depth necessary to allow teachers to properly ingest and try out new ideas and concepts, to practice trial and error, to effectively master new competencies. Processes such as coaching, on the other hand, are far more effective because of their ongoing nature and can provide teachers with a continuous support system (Knight, 2007). Coaching provides such support to coachees, the teachers needing to be coached, by giving them access to coaches, who are more expert or experienced parties. Unlike simple mentoring, however, coaching is a more focused process which addresses specific issues with set goals to be met within set timeframes. Not only practices but efficacies also are enhanced through the establishment of the coach-coachee relationship (Lord, Atkinson & Mitchell, 2008).

Coaching is not simply thrust upon teachers but is rather tailored to the needs of the coachee, giving them an opportunity for input into the process and starting them on the path to understanding their roles and becoming an equally capable peer to their more accomplished coaches (Robbins, 1991). The coaching process is not one that promises instant results, and as in athletic coaching proficiency takes time. This is not a detriment, however, as this gradual adoption of skills fosters greater retention and proficiency (Joyce & Showers, 1982). Precedents for the effectiveness of coaching as a means to induct and develop quality teachers exist worldwide in a number of well-regarded educational systems (Darling-Hammond & Rothman, 2011) and in close neighbors such as Singapore, where students' high mathematical standard is the result of intensive teacher training (Cavendish, 2015).



## THE COACHING SYSTEM

Recognizing the importance of mathematics as an entry point for reason and critical thinking, Bangpleepattanasuksalai School, a private school in Samutprakan, Thailand, serving students in pre-Kindergarten, Kindergarten and Primary levels, designed a coaching system to meet specific needs, namely the development of teacher competencies in the instruction of mathematics to better engage students and cultivate their understanding and mastery of the subject. The Bangpleepattanasuksalai coaching system is divided into two distinct and concurrent components, with preparation and implementation being supported by constant management on the part of the administration.

### Preparation and Implementation

The first stage, preparation, began with the identification of areas needing improvement and the determination of skills needing to be addressed through coaching. All potential stakeholders were then apprised of the aims and parameters of the coaching process. Then the search for qualified coaches began. For the coaching system, Bangpleepattanasuksalai School sought coaches having both extensive expertise in teaching practices who were also able to work in a collaborative, open-minded and nonjudgmental manner (Chien, 2013). As it was important to find coaches with experience in the same subjects and levels taught as the coachees (Birman, Desimone, Porter & Garet, 2000), the search was difficult given the small size of the pool of available candidates in Thailand, but eventually acceptable coaches were discovered. With stakeholders in place, agreement was reached in the definitions of roles and responsibilities.

With preparations made, the practical coaching process began. Coaches were paired with coachees and both parties formally met to evaluate the coachees' competencies through discussion, observation and demonstration. Issues determined to be focused upon included communication, use of instructional media and evaluation techniques. As the coaches' other professional responsibilities placed a constraint on their ability to physically be on-site at Bangpleepattanasuksalai School on an everyday basis, the school administration saw a need to rectify this situation because access to coaches was critical to the success of the entire coaching process. As previously contrasted with short-term off-site training exercises, a key component of coaching is coaches' ability to provide ongoing support (Chien, 2013). As a solution, the administration made full use of technology to counter the lack of physical presence with a virtual presence. While coaches still visited the school for regularly scheduled meetings as they were available, recordings of coachees' classroom instruction and frequent online communication for feedback and consultation were made to be essential parts of the coaching process.

### Management and Results

This support and managerial attention from the administration is part of the key administrative component of the Bangpleepattanasuksalai coaching system, which does not follow the preparation and implementation stages but runs simultaneously with these stages to oversee the process and ensure its successful operation. As a motivation for optimal performance on the part of all stakeholders, it is necessary for the administration to demonstrate dedication to the coaching process (Garmston, 1987) and convince teachers of its importance as a supportive and not punitive measure (Knight, 2009).

The coachees' response to coaching was overwhelmingly positive, as any initial doubts gave way to enthusiasm as the coachees saw the benefits of learning from the coaches' experience. The resulting improvement in student performance was confirmed by gains in standardized test scores as well as awards from competitions both domestic and international and the process proved sustainable as these accomplishments continued into successive academic years with successful coachees graduating to become coaches to the school's other teachers.

## DISCUSSION

Thai schools have found difficulty in obtaining favorable outcomes due to the difficulty in procuring qualified coaches and maintaining a consistent coaching process. Obstructions exist with the educational system in resources and especially time and while attempts have been made, many coaching initiatives become abandoned if taken upon at all.

The two pivotal elements of the success of the Bangpleepattanasuksalai coaching system lie in the administration's commitment to coaching and the innovative introduction of virtual interaction between coaches and coachees as a response to the experts' limited physical availability as on-site coaches. School administrators recognized coaching as their best avenue toward both institutional and student achievement and provided consistent physical, financial and emotional support. Most importantly, collaborative relationships were strengthened despite limited physical contact. Embracing communicative norms of the 21<sup>st</sup> century turned a constraint into an advantage as virtual communication not only accounted for restricted contact between coaches and coachees but in fact surpassed physical meetings by not being itself constrained by school or work hours. This innovation and the design and execution of the coaching system itself earned Banpleepattanasuksalai School recognition as a recipient of Thailand's One School, One Innovation Award in 2019.

## CONCLUSION

Teachers need structured and ongoing systems for professional development. As a means to develop teachers and consequently better teach students, coaching has clear benefits but needs the appropriate support and modifications to flourish within the specific environments of individual organizations. With enough dedication, it is possible for Thai schools to implement coaching systems to improve the country's standard of education.

## REFERENCES

- [1] Birman, B.F., Desimone, L., Porter, A.C. & Garet, M.S. (2000) Designing professional development that works. *Educational Leadership*, 57(8), 28-33.
- [2] Cavendish, M. (2015). Problem solving in Singapore math. Retrieved May 28, 2015, from [http://www.hmhco.com/~media/sites/home/education/global/pdf/white-papers/mathematics/elementary/math-in-ocus/mif\\_problem\\_solving\\_paper\\_lr.pdf?la=en](http://www.hmhco.com/~media/sites/home/education/global/pdf/white-papers/mathematics/elementary/math-in-ocus/mif_problem_solving_paper_lr.pdf?la=en)
- [3] Chien, C.W. (2013) Analysis of an instructional coach's role as elementary school language teachers' professional developer. *Current Issues in Education*, 16(1), 1-8.
- [4] Darling-Hammond, L.; Chung-Wei, R. and Andree, A. (2010). *How high achieving countries develop great teachers*. California: Stanford Center for Opportunity Policy in Education.
- [5] Garmston, R. (1987) How administrators support peer coaching. *Educational Leadership*, 44(5), 18-28.
- [6] Jareeyawittayanon, P. and Sriwattanatumma, I. (1990). Mathematics and national development. *The Journal of The Institute for the Promotion of Teaching Science and Technology*, 18(2). Retrieved June 21, 2015, from [http://www.school.net.th/library/snet2/paper/math\\_develop.htm](http://www.school.net.th/library/snet2/paper/math_develop.htm)
- [7] Joyce, B. & Showers, B. (1982) The coaching of teaching. *Educational Leadership*, 40(1), 4-10.
- [8] Knight, J. (2007). *Instructional coaching: A partnership approach to improving instruction*. California: Corwin Press.
- [9] Knight, J. (2009) Coaching. *Journal of Staff Development*, 30(1), 18-22.
- [10] Lord, P.; Atkinson, M. and Mitchell, H. (2008). *Mentoring and coaching for professionals: a study of the research evidence*. UK: National Foundation for Educational Research.
- [11] Mekanong, A. (2010). "Mathematical skills and processes: develop for development," Bangkok, Thailand: Chulalongkorn University Press, 2010.
- [12] Robbins, P. (1991) How to plan and implement a peer coaching program. Retrieved September 28, 2015, from <http://goo.gl/msTZkS>
- [13] Thailand Development Research Institute. (2012). Much learning, but low scores. Retrieved May 28, 2015, from <http://www.qlf.or.th/Home/Contents/247>

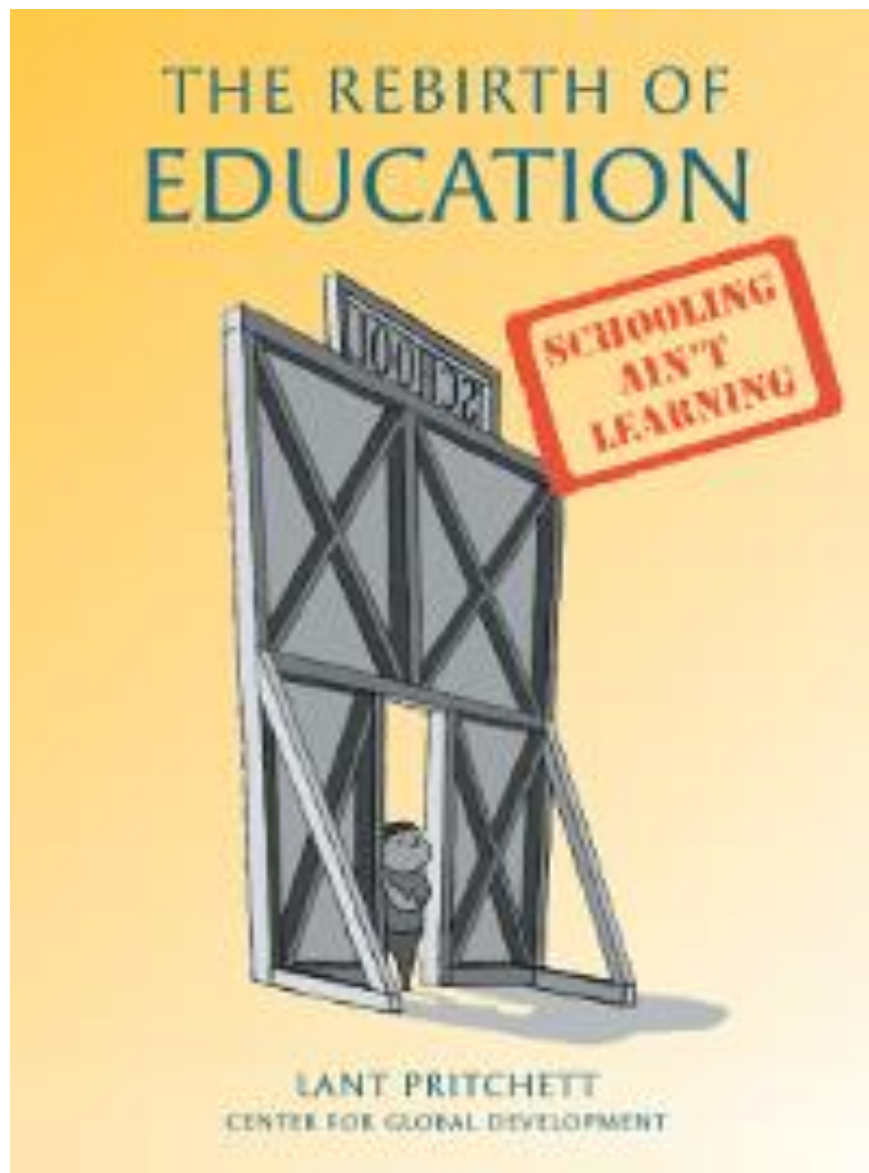


# Book Review

**Book Review: The Rebirth of Education Schooling AIN'T Learning**  
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Every book reviewer has to have the reviewed reason, a simple reason that tell why the reviewer reviewed the book, why people should or should not read it, and what the book says. Here is my book reviewed reason. During the period of 2007-2015, I was working as an external academic assessor in vocational education level in Thailand. I was noticed that the outcome of

external academic assessment score is mostly focused on the school system more than the student learning. The school system is good. It does not mean that the student learning is good. The overall passing the learning test of student is still lower than the standard score. I think I should do something about it. I should find some solutions to solve this issue in the right way. Finally, I found the solution in the book named as “the rebirth of education schooling ain't learning”.

The rebirth of education schooling ain't learning is written by Lant Pritchett. The author gives the meaning of education as the preparation of children to assure their adult rules in the society as loving parents, as engaged citizens, as contributors to their society and their communities, and as the productive workers. In many countries, the promise of schooling like as getting children into seats in the buildings called as a school, has not referred into the reality of educating children. Getting children into the school was the easy part. Schooling has seen a massive expansion, mostly children in the world starting in a school, and nearly all complete in the primary school.

The book of the rebirth of education schooling ain't learning is divided into six chapters follow as

Chapter 1 Schooling goals versus Education goals,

Chapter 2 More schooling alone won't necessarily give an education,

Chapter 3 More of the same is just more of the same,

Chapter 4 Camouflage of the spider and dangers of centralized school systems

Chapter 5 Why spiders came to dominate schooling, and

Chapter 6 The rebirth of education as starfish ecosystems of educators.

After reading all chapter in the book of the rebirth of education schooling ain't learning, I recommend the readers that the Chapter 1 is firstly required to be read along with the introduction. The readers will get the ideal how are the schooling goals and education goals different and what is really needed to solve the problems in the education systems in the different issues. Then, the readers can easily go forward to the Chapter 6 for the conclusions. However, readers should not read just only Chapter that you really interest in because, in my opinion, the author wrote the Chapter is serried into next Chapter.

In my opinion, the book of the rebirth of education schooling ain't learning is shown me the two ideals. First, Lant Pritchett thoroughly convinces the completeness of evidence on the learning problem in so much of the developing world. Second, the author's adamant refusal to set out any single better spider model for school systems to produce learning. The author instead promotes fostering the conditions for new starfish model approaches. I believe that the readers really need to make the decision which model would really fit in your education systems.



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Lant Pritchett's idea for a rebirth of education has a few to do with the organizational systems and much to do with breaking schools free of their old rules in an entirely different and far less interconnected and interdependent global economy. As a reviewer, I think it will be difficult. The success of the last decades in getting to primary school enrollment has built in patterns of thought, advocacy, and action that are hard to alter even when it is clear that is not change.

In Thailand education systems, I think, the book of the rebirth of education schooling ain't learning is strongly supported my ideal to solve the learning problem in the school system by breaking schools free of their old roots in different learning systems and interconnected and interdependent into the global learning matters. Please do not believe me yet until you find the way and do whatever to get the results.

#### REFERENCE

Pritchett, Lant. (2013). The rebirth of education schooling ain't learning, Center for global development, Brookings institution press, Washington, D.C., US.

# Research Articles

## A Study of Development of a Model of Semi-compulsory Social Security Coverage for Independent Workers

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### ABSTRACT

This research had an objective to propose developing guidelines of a model of semi-compulsory social security coverage for independent workers as part of improving the quality of life for independent workers and self-employed people. It was conducted as mixed-method research including the Documentary Research, Field Study and Focus Group. The study participants were composed of 120 stakeholders including the elderly, self-insured persons under Article 40, volunteers, core leaders of the Article-40 Social Insurance Network in Nonthaburi province. The tool used to collect data was a questionnaire about the development of Article 40 semi-compulsory social insurance benefits whereas the data were then analyzed in terms of frequency and percentage. The findings revealed that in order to develop the semi-compulsory social security coverage for independent workers, the Social Security Office should choose the development of social insurance benefits under Article 40 so that people who are independent workers of all sexes, ages and careers are entitled to the rights. From mathematical analysis, social insurance benefit that can be developed is that for the death case only because it is a privilege that everyone must have. Again, for the social security coverage to be developed, in the beginning phase, it should be compulsory for 60 - 65 year independent workers and depends on voluntary consent for those aged 15 - 59 years. According to the results from the questionnaire, the elderly in the independent labor want to receive protection from the Social Security Office because it helps create social insurance for themselves and it is to make a careful plan for themselves not to be a burden to those who are behind when they die; moreover, those above 60 years of age are also confident that they can continue to make the contribution because they regularly have elderly allowance from the government. The development of a model of semi-compulsory social security coverage for independent workers also supports the government policy to provide the independent sector workers with the social security coverage and to reduce social inequality among individuals.

**Keywords:** Social Insurance Under Article 40, Benefits from the Social Insurance under Article 40,  
Model of Social Security Coverage, Independent Workers

## 1. INTRODUCTION

In 2011, according to the Royal Decree Prescribing Criteria and Rates of Contribution Payments, Types of Benefits and the Rules and Conditions of the Right to Receive Benefits for the Person Applying for the Self-Insurance, B.E. 2554 [1], there are 2 options for the insured persons under Article 40 (IPA40) to choose for the social security coverage as follows:

Option 1: for the contribution payment rate of 100 baht / month (70 baht / month paid by the IPA 40 and the other 30 baht / month paid by the government support), the IPA 40 will receive coverage benefits in 3 cases including 1) danger or illness, 2) disability and 3) death.

Option 2: for the contribution payment rate of 150 baht / month (100 baht / month paid by the IPA 40 and the other 50 baht / month paid by the government support), the IPA 40 will receive coverage benefits in 4 cases including 1) danger or illness, 2) disability, 3) death and 4) old age.

In 2013, another option 3 of old age case in the coverage benefits was proposed by the SSO in the Royal Decree Prescribing Criteria and Rates of Contribution Payments, Types of Benefits and the Rules and Conditions of the Right to Receive Benefits for the Person Applying for the Self-Insurance (no.2), B.E. 2556 [2]; thus, for the contribution payment rate of 200 baht / month (100 baht / month paid by the IPA 40 and the other 100 baht / month paid by the government support), the IPA 40 will receive another coverage benefit of old age pension. However, for the old age pension, the IPA 40 cannot make more contribution payment than 1,000 baht.

In 2015, the coverage of the old age pension was cancelled by the SSO in the Royal Decree Prescribing Criteria and Rates of Contribution Payments, Types of Benefits and the Rules and Conditions of the Right to Receive Benefits for the Person Applying for the Self-Insurance (no.3), B.E. 2558 [3]; thus, only option 1 and 2 were left and option 3 was ended. Therefore, the informal workers were not motivated to apply for the social security coverage and some of them were also calling for improvement of the benefits in the social insurance under Article 40.

In 2018, the benefits of option 1 and 2 were added without increased contribution payment and another option 3 covering 5 cases including injury or illness, disability, old age and funeral allowance was also added at the contribution payment rate of 450 baht / month (300 baht / month paid by the IPA 40 and the other 150 baht / month paid by the government support) in the Royal Decree Prescribing Criteria and Rates of Contribution Payments, Types of Benefits and the Rules and Conditions of the Right to Receive Benefits for the Person Applying for the Self-Insurance, B.E. 2561 [4].

In 2019, the Draft of Royal Decree on the Qualifications of Persons Who May Apply to be Insured (Version ..) B.E. ...which was proposed by the Ministry of Labor and passed the considerations by the Office of the Council of State, the Office of the National Economic and Social Development Council (ONESDC) and the Budget Bureau was approved by the Cabinet Resolution on 24<sup>th</sup> December 2019 [5]. In essence, this Decree was to amend the qualification for the IPA 40 in the Social Security Act, B.E. 2533 (1990) from formerly, "must be at least 15 years of age and not over 60 years of age" to "must be at least 15 years and not more than 65 years of age."

Due to the change of laws and the current social situation that there are more elderly people, the researchers are interested in studying the social security coverage for independent workers aged 60 - 65 years, which is a group of people who are still healthy, able to work and be self-employed in response to the government's policy to solve the social inequality and improve the quality of life for the said elderly.

## 2. OBJECTIVE

To propose developing guidelines of a model of semi-compulsory social security coverage under Article 40 for independent workers

## 3. DEFINITION

An insured person under Article 40 refers to an independent worker who registered and paid the contributions for the IPA 40 of the SSO.

Independent workers refer to those people who are eligible to register for the IPA 40 of the SSO.

The elderly refer to those aged 60 - 65 years who are Thai nationals.

Semi-compulsory social security coverage means that is compulsory for those aged 60 - 65 years and not for those aged 15 - 59 years to enter the social security coverage.

## 4. LITERATURE REVIEW

As follows are theories and concepts related to the research.

### Communication

Jarupongsopon, Wittaya. [6] pointed out that the communication theory that empowers independent workers to understand and need to register as an insured person consists of 6 steps as follows:

Step 1: Exposure encourages the independent workers to accept news about the social security coverage.

Step 2: Attention encourages the independent workers to be interested in becoming an insured person in the SSO.

Step 3: Comprehension means the message sent by the SSO is understandable to the independent workers.

Step 4: Yielding is the communication that empowers the independent workers to appreciate and respond.

Step 5: Intentions are what the SSO must do to enable the independent workers to intend to apply as an insured person.

Step 6: Behavior means when the independent workers intend to apply as an insured person, the SSO manages the registration process.

According to Aaker, D.A. [7], information perception based on the marketing communications is a result of 5 types of activities, which are:

(1) Advertising that news and information of products and services are sent through various media to the target group.

(2) Marketing Promotion Activities which are done to motivate the consumers by distributing and organizing such as sweepstakes, freebies, and vouchers, etc.

(3) Online Marketing Communications which are done through website online ads and videos and other social media.

(4) Event Marketing and Sponsorship Activities which are done to in order to create broaden and deepen bond between the products and the consumers.

(5) Brand Amplifiers that promote, make public relations or tell someone the brand products etc.

### Social Protection



Sumitanan, Roongpetch. [8] define the social protection as the management of systems or measures to protect the basic rights of all citizens in terms of social services social security and social assistance. Moreover, this also refers to formal and informal protection covering the Social Safety Nets for the underprivileged and the poor and the Social Risk Management arising from the economic and social crises and various disasters.

According to the National Economic and Social Development Council, Office of. [9]; the social protection is defined as the management of systems or measures to protect the basic rights of all citizens in terms of social services social security and social assistance. Moreover, this also refers to formal and informal protection covering the Social Safety Nets for the underprivileged and the poor and the Social Risk Management arising from the economic and social crises and various disasters.

#### **Integration of Cooperation**

Charoenwongsak, Kriengsak. [10] interestingly suggested that integration-based thinking consists of 3 steps: Step 1, a thinker should be free from the traps of thought, culture, knowledge, and experience, etc. Step 2, he should think based on the concepts of such as holism, inter-discipline, induction, positive-and-negative coordination and win-win conclusion and Step 3, he should think within any certain conceptual framework; thus, he turns to the concept of integration again.

#### **Social-Security-related Laws**

According to the Government Gazette [11] in the Social Security Act (no. 4), B.E. 2558, there are amendments related to the social security coverage under Article 40 as follows:

Article 19. The provision of Article 40 of the Social Security Act, B.E. 2533 (1990) shall be repealed and replaced by the following:

Article 40. Any other person who is not an employee under article 33 or not subject to this Act may apply to be an insured person under this Act by expressing his or her intention to the Office. Qualifications of such person shall be as prescribed in the Royal Decrees.

Criteria and rates of the contributions remitted by insured persons, types of benefits entitled to under Article 54 and criteria and conditions of benefit entitlement shall be prescribed in the Royal Decrees.

The Government shall make contributions to the Fund at the rate prescribed in the Ministerial Regulations, but shall not exceed one-half of the amount of contributions received from the insured person under paragraph one.”

According to the Government Gazette [4], in the Royal Decree Prescribing Criteria and Rates of Contribution Payments, Types of Benefits and the Rules and Conditions of the Right to Receive Benefits for the Person Applying for the Self-Insurance, B.E. 2561, the benefits added for the insured person under Article 40 are as follows:

Article 6. The insured person who contributes to the fund seventy baht per month is entitled to compensation benefits as follows: (1) compensation benefit in case of danger or illness, (2) compensation benefit in case of disability and (3) compensation benefit in case of death.

Article 7. The insured person who contributes to the fund one-hundred baht per month is entitled to compensation benefits as follows: (1) compensation benefit in case of danger or illness, (2) compensation benefit in case of disability, (3) compensation benefit in case of death and (4) compensation benefit in case of old age.

Article 8. The insured person who contributes to the fund three-hundred baht per month is entitled to compensation benefits as follows: (1) compensation benefit in case of danger or illness, (2) compensation benefit in case of disability, (3) compensation benefit in case of death, (4) compensation benefit in case of old age and (5) child allowance.

#### **The Elderly-related Law and Concepts**

In the Government Gazette [12], the Act on the Elderly, B.E. 2546 (2003 A.D.) defined “the elderly” as persons who have attained the age above complete sixty years and are of Thai nationality.

According to Petchkong, Duangporn [13], the old-age pension is a monthly welfare provided to the elderly aged 60 years and more to help and ease their burden of living expenses. Each year, the registration is held for those who are eligible to register to receive the allowances for the elderly. In the Rules by the National Committee on the Elderly (NCE) on the Payment Criteria of the Old-age Pension, B.E. 2552 (2009), there are the criteria of the entitlement, and the elderly registration and qualifications. According to this Rules, the elderly receive the monthly old-age pension in accord with the range of age until their deaths as follows:

- The elderly aged 60 – 69 receive 600 baht monthly.
- The elderly aged 70 – 79 receive 700 baht monthly.
- The elderly aged 80 – 89 receive 800 baht monthly.
- The elderly aged 90 – their deaths receive 1,000 baht monthly.

The elderly registered in 2017 will begin to receive their first old-age pension from October 2018 onwards.

## **5. METHOD**

It was conducted as mixed-method research including the Documentary Research, Field Study and Focus Group.

The study participants were composed of 120 stakeholders including the elderly, self-insured persons under Article 40, volunteers, core leaders of the Article-40 Social Insurance Network in Nonthaburi province and the SSO's academics and executives

The tools were a questionnaire about the model development of Article-40 semi-compulsory social security benefits used to collect the data from the stakeholders in the Article 40 and the note-taking forms used to collect the data from the Focus Group meetings among the social security experts and the SSO executives.

The data analysis consisted of the following steps: 1) The study results from the theories and concepts related to the research including communications, social security protection, integration of cooperation, social-security-related laws and the actuarial study were concluded and used in the analysis in seeking the Social Security Coverage under Article 40; 2) The analysis results in seeking the Social Security Coverage under Article 40 were used in the synthesis in seeking the Semi-Compulsory Social Security Coverage under Article 40, used to develop the question items in the questionnaire to collect the data from the stakeholders and in the Focus Group meetings held among the social security experts and the SSO executives and 3) the results from the questionnaire and the Focus Group meetings were properly concluded as the model of the semi-compulsory social security coverage for independent workers.

Some of the data were statistically analyzed in terms of frequency and percentage.

## 6. RESULTS

1) As for the synthesized result of the model of the semi-compulsory social security coverage for independent workers that provides only death protection and collected the contribution rates of 20-30 baht / month, it was found that according to the actuarial principles forcing the elderly aged 60 - 65 years into the coverage system through the integrated cooperation among government agencies to collect the contribution payments is possible. At the same time, those other workers aged 15 – 59 years can enter the social security coverage on voluntary purpose as well and the social security fund is still stable to look after the insured in the social security system.

2) As for the results from the questionnaire about the benefit coverage under Article 40 for only the case of death with the low contribution rate supported by the government distributed among 120 old age persons and other stakeholders, it was found that 98 % (118 persons) of the elderly and other stakeholders agree. Regarding the issues of being compulsory and on voluntary purpose, 73 % (83 persons) of them agree with that for the elderly aged 60 - 65 years, the social security coverage should be compulsory and on voluntary purpose for those aged 15 - 59 years. 70 % (83 persons) of them agree with that the elderly receive only the benefit from death and have to pay the contribution. However, as for the benefit of funeral expenses allowance of 30,000 baht, 62.50% (75 persons) of them agree to pay 20-baht-monthly contribution and 55.83 % (67 persons) of them agree to pay 30-baht-monthly contribution for the benefit of funeral expenses allowance of 40,000 baht as shown in Table 1.

**Table 1.** opinions of the elderly and other stakeholders on the development of the semi-compulsory social security coverage for independent workers

n = 120

No.	Questions	Number (persons)	Percentage
1	If the SSO develop the social security coverage for death only requiring 20 – 30 baht contribution from each, do you agree or not?		
	agree	118	98
	uncertain	2	2
	disagree	0	0
2	If the SSO develop the social security coverage under Article 40 compulsorily for the elderly aged 60-65 years, do you agree or not ?		
	agree	83	73
	uncertain	37	27
	disagree	0	0
3	If the SSO forces 60-65-year independent workers to enter the social security coverage under Article 40 for the death case only by collecting the contributions from their old age pension, do you agree or not ?		
	agree	90	75
	uncertain	20	16.67
	disagree	10	8.33
4	If you choose the coverage of 30,000-baht funeral arrangement allowance, you are happy to pay the contribution at the rate of .....baht monthly.		
	15 baht monthly	20	16.67
	20 baht monthly	75	62.50
	25 baht monthly	25	20.83
	At the rate of .....baht monthly		

**Table 1.** Continued from previous page

n = 120			
No.	Questions	Number (persons)	Percentage
5	If you choose the coverage of 40,000-baht funeral arrangement allowance, you are happy to pay the contribution at the rate of .....baht monthly.		
	20 baht monthly	30	25
	30 baht monthly	67	55.83
	40 baht monthly	23	19.17

3) As for the results of the Focus Group meetings held among the social security experts and the SSO executives about the development of the compulsory social security coverage of death case only for independent workers aged 60 – 65 years, the problems which have been found are as follows: Some of the elderly are so poor and having too much family responsibilities that they cannot pay the contributions. Some of them have already had the funeral expenses allowances by private sector so they are not interested to have another one more that is too redundant. However, if the government provide supporting budget for the SSO to pay the contributions for all of those IPA 40, the mentioned compulsory social security coverage of death case only can be done on the condition that the appropriate rate of the contributions should be estimated by the actuarial study.

4) From the synthesis for the model development of the Semi-Compulsory Social Security Coverage under Article 40, the following 4 issues were found:

4.1) It should be based on the benefits of which everyone has equal rights, such as death because everyone has to die.

4.2) It should be based on the integrated cooperation among related agencies such as the Ministry of Social Development and Local Administrative Organizations, and etc; to collect the contributions for the convenience of the elderly.

4.3) As for the contribution rate for the benefit of the death case, it should not be so high because it can be low according to the actuarial study; for example, 5 – 10 baht monthly rate for the benefit of 20,000 baht or 15 – 20 baht monthly rate for the benefit of 40,000 baht etc. However, it can be the social security coverage for death for all if the contribution is paid by the government

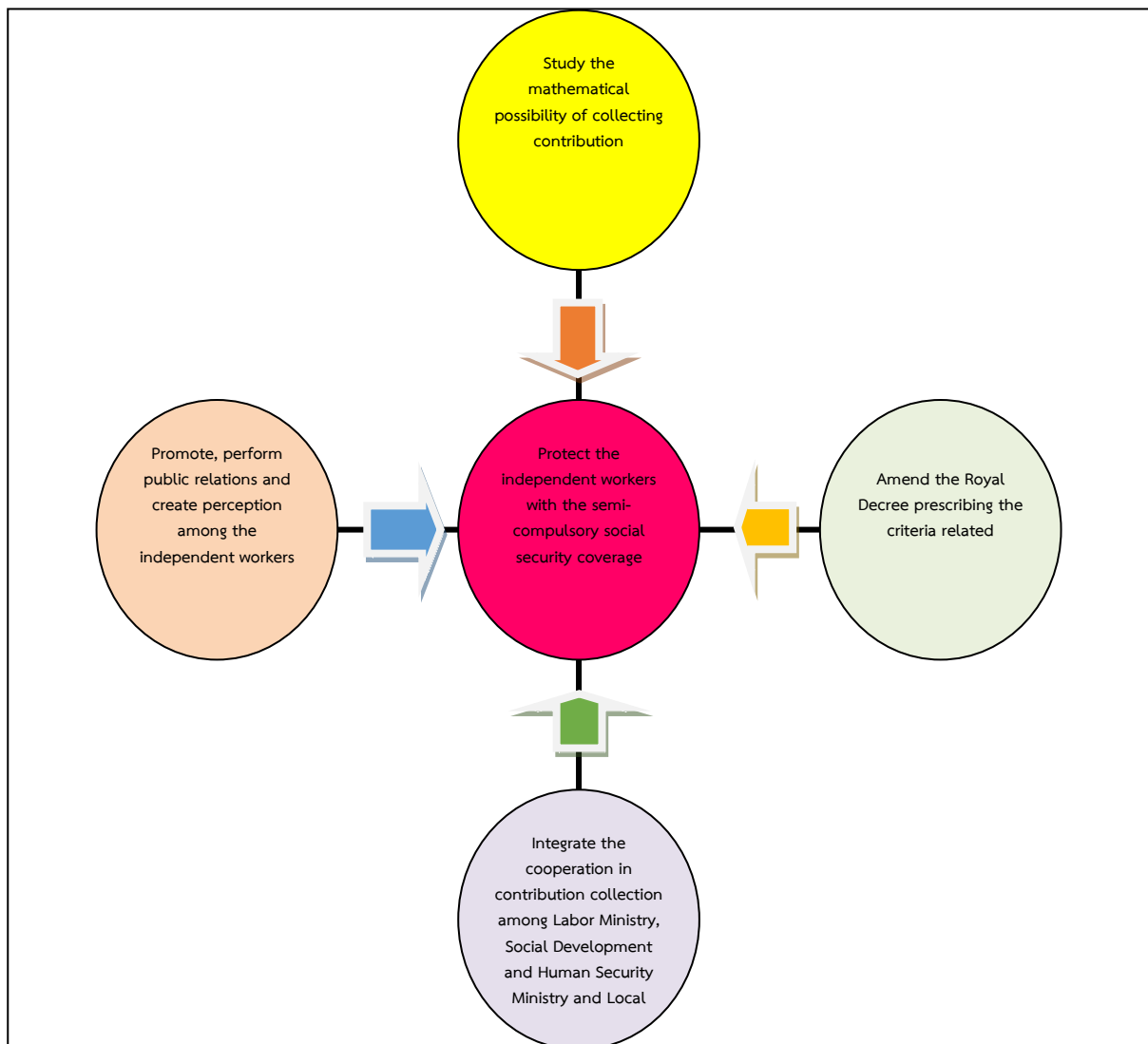
5) The Development Guidelines for the Model of the Semi-Compulsory Social Security Coverage under Article 40 has been done as follows:

5.1) The actuarial study was conducted to find a suitable contribution rate with the aim for the insured persons to receive maximum benefits and low contribution rates. This was also for the stability of the fund.

5.2) The Draft of the Royal Decree Specifying the Qualifications of Persons Who May Apply to Be Insured (version ..) B.E....was proposed to socially protect the independent workers aged 60 – 65 years.

5.3) The public relations about the Semi-Compulsory Social Security Coverage under Article 40 was performed regularly among the independent workers.

5.4) The integrated cooperation among related agencies such as the Ministry of Social Development and Local Administrative Organizations, and etc; to collect the contributions for the convenience of the elderly was conducted as shown in Figure 1.



**Figure 1:** The Model Development of the Semi-Compulsory Social Security Coverage under Article 40

## 7. DISCUSSION

From the Model Development of the Semi-Compulsory Social Security Coverage under Article 40, 3 issues are discussed as follows:

1 ) According to the questionnaire result, most of the elderly are happy to be protected under the Semi-Compulsory Social Security Coverage under Article 40 because they never want to leave any burden to their children after their deaths. This is consistent with the SSO [14] having drafted “the Draft of the Royal Decree Specifying the Qualifications of Persons Who May Apply to Be Insured (version ..) B.E....” to allow the elderly aged 60 – 65 years to enter the coverage and they are willing to pay the contribution because they have monthly old age pension.

2) As for the benefit of only death case having selected in the Social Security Coverage under Article 40, it is because the contribution to be paid is fairly low and it is the benefit for people of all sexes, ages, and occupations likely to use also. According to the SSO's [15] study on expanding the scope of social security coverage to informal workers in the Thai context, it revealed that age is related to the application to be insured under Article 40, and in line with the situation of Thailand entering the aging society completely in 2020, with the elderly at the rate of 20%. Promoting the elderly to have the social security under Article 40 is to create security in life and to reduce social problems of the elderly as the workers in the independent labor sector.

3) The Development of the Semi-Compulsory Social Security Coverage under Article 40 is a new approach for Thailand and a study of foreign research by the Social Security Office [15] found that the Philippines and Indonesia have applied social security protection system for informal workers in compulsory form. From this study results, this Social Security Coverage should be compulsory for the elderly aged 60 – 65 years and on voluntary purpose for other workers aged 15 – 60 years. Therefore, the Semi-Compulsory Social Security Coverage under Article 40 is in line with needs and context of the population of Thailand.

## 8. RECOMMENDATIONS

For more comprehensive data, the opinions on the Semi-Compulsory Social Security Coverage under Article 40 from the stakeholders like this should thoroughly and further be collected across the country. The SSO should pay attention to completely entering the aging society of Thailand to extend the age range of the IPA 40 in order to have a comprehensive social security coverage system, to reduce the social inequality and to encourage the elderly to properly plan their lives for themselves in the future.

## REFERENCES

- [1] Royal Thai Government Gazette. 2011. **The Royal Decree Prescribing Criteria and Rates of Contribution Payments, Types of Benefits and the Rules and Conditions of the Right to Receive Benefits for the Person Applying for the Self-Insurance**, B.E. 2554. Bangkok: Volume 128, Section 34 Kor, dated 11 May 2011.
- [2] Royal Thai Government Gazette. 2013. **The Royal Decree Prescribing Criteria and Rates of Contribution Payments, Types of Benefits and the Rules and Conditions of the Right to Receive Benefits for the Person Applying for the Self-Insurance (no.2)**, B.E. 2556. Bangkok: Volume 130, Section 97 Kor, dated 25 October 2013.
- [3] Royal Thai Government Gazette. 2015. **The Royal Decree Prescribing Criteria and Rates of Contribution Payments, Types of Benefits and the Rules and Conditions of the Right to Receive Benefits for the Person Applying for the Self-Insurance (no.3)**, B.E. 2558. Bangkok: Volume 132, Section 106 Kor, dated 11 November 2015.
- [4] Royal Thai Government Gazette. 2018. **The Royal Decree Prescribing Criteria and Rates of Contribution Payments, Types of Benefits and the Rules and Conditions of the Right to Receive Benefits for the Person Applying for the Self-Insurance**, B.E. 2561. Bangkok: Volume 135, Section 19 Kor, dated 27 March 2018.

- [5] Thai Cabinet Resolution. 2019. **Approval in principle of the draft of royal decree specifying the qualifications of persons who may apply to be insured (No. ..) B.E. ... on 24 December 2019.**
- [6] Jarupongsopon, Wittaya. 2014. **Brand Management Strategy.** Bangkok: Plan Printing.
- [7] Aaker, D.A. 1996. **Managing Brand Equity.** London: The Free press.
- [8] Sumitanan, Roongpetch. 2013. **Social Protection.** (Online), Retrieved on 2<sup>nd</sup> January 2020. and accessible from <http://www.rainbow.com>,
- [9] National Economic and Social Development Board, Office of the. 2002. **National Economic and Social Development Plan No.9 on page 37.**
- [10] Charoenwongsak, Kriengsak. 2003. **Definition of Integration.** (Online), Retrieved on 10 March 2015 and accessible from [http://www.m-society.go.th/Article\\_attach/8965/11327.pdf](http://www.m-society.go.th/Article_attach/8965/11327.pdf)
- [11] Royal Thai Government Gazette. (2015). **The Social Security Act (no.4), B.E. 2558.** Bangkok: Volume 132, Section 53 Kor, dated 22 June 2015, p. 1-13.
- [12] Royal Thai Government Gazette. 2003. **The Elderly Act B.E. 2546.** Volume 120, Section 130 Kor, dated 31 December 2003.
- [13] Petchkong, Duangporn. 2017. **The old-age pension**, page 2-3 of an article broadcast in the Legal Intentions Program on the Parliament Broadcasting Station under the Secretariat of the House of Representatives
- [14] Social Security Office. (2019) **The Draft Royal Decree specifying the qualifications of persons who may apply to be insured (version ..) B.E. ...**
- [15] Social Security Office. 2019. **The Research Project to Expand the Scope of Social Security Coverage to Informal Workers in the Thai Context.** Nonthaburi.

## A Study of Guidelines on Integration of Services for The Self-insured Persons Through Local Administrative Organizations

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### ABSTRACT

The purpose of this research was to propose the guidelines on integration of services for the self-insured persons under Article 40 (IPA 40) through local administrative organizations (LAO) in accordance with the Cabinet's resolution regarding services to the people. It was conducted as the mixed research between the Documentary Research and the Field Study together with the Focus Group. In this study, there were 180 participants consisting of insured persons, labor volunteers, and social security network and community leaders. In addition, there were 58 interviewees including administrators of the LAOs who gave the data about the service channels for IPA 40, administrators of the Social Security Office (SSO) who gave the data about the service channels through the LAOs and the IPA 40. The data were collected by an opinion survey about guidelines of the services for IPA 40 through the LAOs and a form of structured interview and then they were analyzed in terms of frequency and percentage. The results of the research showed that the services are based on the cabinet resolution and the concept of modern government management by using electronic networks. In terms of the IPA 40's needs, 82 % of them have agreed to allow the LAOs to locally provide the service to receive the IPA 40's contribution payment whereas 84 % of them have agreed to use the LAOs' services free-of-charge and 76 % of them have agreed that the IPA 40's contribution payment is a part of the LAOs' tasks. In terms of the guidelines of the integration, they should be done in compliance with firstly the Act of Plan and Procedure Design for Decentralization to the LAOs; secondly, the information technology (IT) system for the integration of the services among government agencies. In this regard, the services for the IPA 40 should cover 4 areas as follows: (1) registering service, (2) contributions payment service, (3) depository documents for compensation benefits under the Social Security Article 40 (4) public relations campaigns of the knowledge of social security coverage, Article 40, at the local level.

**Keywords:** Article 40 of Social Security, Benefits According to the Article 40 of Social Security, Guidelines on Integration of Services According to the Article 40, Social Security for Informal Labors, Article 40



## 1. INTRODUCTION

The Social Security Office [SSO] [1] has extended social security coverage to informal workers according to Article 40 since 2011 and it has been found that as of June 2017, the accumulated number of the self-insured people was 2,293,916 consisting of 703,173 general / contracting employees, 645,038 farmers and 358,137 small traders and street vendors respectively.

According to Division of Research and Development, the SSO [2]; as of June 2017, among 2,293,916 self-insured people, there were only 804,964 or 38.63 % of them having conducted the contribution payment. This shows that this percentage of the IPA 40 below 60 having paid the contribution may affect the stability of the Social Security Fund in the future; there may not be sufficient funds to pay benefits to the self-insurers continuously.

Although the SSO [3] has had an agreement with various service providers to provide additional methods or options convenient for the IPA 40 to pay monthly contributions including channels through the SSO / Service Delivery Unit (SDU), bank counter, the Counter Service of the 7-11 branches and Tesco Lotus and even through bank direct debit but it appears that 69.38 percent of them still prefer to pay the monthly contributions through the services of the SSO and the SDU and 27.72% prefer to do so through the Counter Service of the 7-11 branches [4].

The problem that the IPA 40 still prefer to pay their monthly contributions through the services of the SSO and the SDU is because they trust them and no services fees are paid; however, they have to pay for travelling cost if they choose to pay the contributions at the counter services by either 7-11 branches or Tesco Lotus department stores or banks. Therefore, the increased service channels for the IPA 40 in rural areas where the IPA 40 have not the travel cost to receive the services are required. To do so is in accordance with the Cabinet's resolution on June 28, 2016 which approved in principle that relevant government agencies such as government agencies, state enterprises and local government organizations having to receive money from the public should install electronic payment devices sufficient to meet the needs of the public, revise the rules and regulations to support the said electronic payment quickly without service charge. The authors are interested in doing a study of the guidelines on integration of services for the IPA 40 through the LAOs including Provincial Administration Organizations (PAO), Sub-district Administrative Organizations (SAO), and municipalities in order to add more service channels for them and to be part of the integration of public services which are convenient, fast and cost-effective according to the government policy.

## 2. OBJECTIVE

1. To study the cabinet resolution, the service-related laws and regulations of the SSO, Ministry of Labor and the LAOs, Ministry of Interior
2. To propose the possibility of integrating the services for the IPA 40 through the LAOs

### 3. DEFINITION

An insured person (IPA 40) means a freely employed person who has applied for registration and has already paid contributions as the insured person to the SSO.

Local administrative organizations (LAOs) refer to provincial administration organizations, sub-sub-district administrative organizations, and municipalities.

Integration refers to the services cooperation of the SSO and the public in the IPA 40 registration, receiving contribution payment, requesting benefits, promoting public relations among the IPA 40 to enter the social security protection system, Article 40

### 4. LITERATURE REVIEW

The related literature is as follows:

#### 4.1 Services

According to the Cabinet Resolution [5], relevant government agencies involved in accepting money from people including government agencies, state enterprises, and the LAOs, etc., were approved to install e-payment equipments sufficient for providing services to the public; thus, the installation were assigned to start in September 2016 and to be completed by September 2017. Moreover, regulations and criteria related to the e-payment were assigned to be quickly amended and the operations were to be complying with the guidelines of the National e-Payment Strategic Plan Commission.

The e-Government is a concept of modern public management in which the development and improvement of the government work to meet the needs of the people are performed by using information technology as a tool for providing government services through electronic networks to increase the efficiency of access to government services. [6]

The Office of the Public Sector Development Commission [7] had identified important flagship projects that must have been urgently implemented, especially, the Project to Promote and Develop Excellence in Public Services aiming to encourage government agencies to develop excellent and easily accessible services, to provide a variety of services suitable to the different needs of the people, to collaborate with one another to provide efficient and cost-effective public services through analysis of the procedures and operations of each agency, and to encourage them to improve their public services such as the Collaborative Integrated Service Delivery, the Personalized Service Delivery and the Single Window Service which will lead to proactive service management responding to the needs of each group of people by the OPDC in collaboration with related ministries, departments and provinces.

#### 4.2 Electronic Services

According to the Ministry of Information and Communication [8], the National Electronic Government Network is the network of computer or electronic systems of the work processes and information among various government agencies either division, office, center, department, ministry or others levels, both within or across agencies to be able to carry out transactions electronically together for people as service users. However, the work processes and information may be related to the same transaction via the integrated electronic transaction system or having multiple services together in the same service window system.

In the 3<sup>rd</sup> ICT Master Plan Development Project for 2016 – 2019 of the Department of Groundwater Resources [9], the design of information and service system is determined by the Service Oriented Architecture (SOA), which helps the service able to systematically link the data. The standard of the self-identification of the Web Services performs the data connection using the SOV architecture, regardless of the type of platform or application in which the data are connected. The system design in which its infrastructure is divided into parts allows the system to be able to work together for the desired objectives. The basic SOA is the Web Service which can connect directly to the data and send messages to another machine of the system by the Simple Object Access Protocol (SOAP) without needing to save the data again. In acquisition of further software, it should be confident that the methods used for the system development by the developer are consistent with the Web Services and The SOA. Moreover, in order to develop a new application, its functions should be examined whether they are able to perform other tasks or not. The Web Services should also be supported to connect to other systems / services in the future.

According to Kamnoonwat, Banyat [10] in his book—Digital Government Development Direction, the then Prime Minister of Thailand presented a vision of having in 3 years ahead a digital government based on inter-agency integration, smart operations, public-oriented services and real commitment to change.

#### 4.3 Integration

In this study, the integration is related to a Thai law and some theories as follows:

Act on Decentralization Plan and Procedures for the LAOs B.E. 2542, volume 116, part 114a, and dated 14<sup>th</sup> November 1999 [11] of which Chapter 2 determining powers and duties in organizing public services in Section 16 enacts that Pattaya City Municipality and Subdistrict (Local) Administrative Organization have the power and duty to organize public services for the benefit of their own local people as in item (10) : social work and the development of the quality of life for women, the elderly and the disadvantaged.

The Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh [12] is a combination of the theory of acceptance behavior and the Theory of Reasoned Action (TRA) suggested that it has some limitations and lacks consistency in ranking, prediction of specific behavior, attitude, and intention to accept actions in terms of goals, and contexts. Moreover, Venkatesh argued that organizations are beginning to learn how to make good use of technology and begin to reduce the gap between IT professionals and system reliability and that good time and experience may make IT bridge the gap between the individual and organizational understandings in support of the IT.

The Theory of Planned Behavior (TPB), developed by Eagly and Chaiken [13], suggests that even such variables as habits, morals, obligations and personal characteristics of people can predict the intentions and behaviors as suggested by the Theory of Reasoned Action (TRA), they are not found in the TPB.

## 5. METHOD

This research was conducted in the mixed form of the Documentary Research and the Field Study together with the Focus Group.

The study consisted of 180 participants including insured persons, labor volunteers, and social security network and community leaders. In addition, there were 58 interviewees including administrators of the LAOs, administrators of the SSO and the IPA 40 in the provinces of Udon Thani, Suphanburi and Pathumthani.

The tools were an opinion survey about the guidelines on the integration of the services for IPA 40 through the LAOs and a form of structured interview to be done with the administrators of the LAOs, and the SSO and the IPA 40.

Steps of data analysis were as follows: 1) To analyze possible implementation from the Cabinet's resolution dated 28<sup>th</sup> June 2016 that all government agencies, state enterprises, and the LAOs, etc., were approved to install e-payment equipments sufficient for providing services to the public and that regulations and criteria related to the e-payment and how to create the network of the LAOs to provide the SSO's services for the IPA 40s in local areas were assigned to be quickly amended and implemented; 2) To roughly design the channels to provide services for the IPA 40s through the LAOs from the analysis and synthesis of the related laws and how to create the network in the previous step 1; 3) To take the results from step 1 and 2 to ask for opinions from stakeholders including the IPA 40, community leaders, labor volunteers and the SAO's administrators; 4) To take the opinions and recommendations from step 3 to ask for the opinions of the LAOs' administrators about the draft of the integrating guidelines before designing them meeting the needs of those IPA 40, community leaders, labor volunteers and the SAO's administrators to integrate the public services enabling people to get the local access to the social security via the LAOs.

Statistics used in the data analysis were frequency and percentage.

## 6. RESULTS

The findings were summarized as follows:

1. The laws, regulations, and guidelines regarding provision of efficient and convenient services in the social security system and use of technology to reduce the process and documents have been studied and done respectively to integrate the services.

(1) According to the Cabinet Resolution, 2016; the government has approved in principle to have government agencies, enterprises, and the LAOs install sufficient electronic payment – receiving machines and operate these machines according to the Social Security Commission Regulations on Money Receiving, Payment and Storage of the Social Security Fund 2012. [14]

(2) The creation of a network of cooperation between the SSO and the LAOs in receiving contributions from the IPA 40 has been carried out in accordance with the Act on Decentralization Plan and Procedures for the LAOs B.E. 2542 [11], Chapter 2 on the determination of powers and duties in organizing the public service system, Article 16, authorizes that the Pattaya City Municipality and the Tambon Administrative Organization have the power and duty to organize public services for the benefit of their own local people, especially item (10) indicating “social work and the development of the quality of life of women, the elderly and the disadvantaged”.

In addition, to facilitate access to public services, if the SSO wants to transfer those services including IPA40 registration, receiving contribution payment, and public relations of the social security coverage to the LAOs, it can be done by submitting the proposal to the Social Security Commission to approve.

2. Opinions and Suggestions about the Service Channels for the IPA 40 via the LAOs.

The results of this study revealed that the stakeholders gave opinions and suggestions about the cooperation channels for providing the IPA 40 with the services via the LAOs in 3 aspects as follows:

As for aspect 1: the service of registration for the IPA 40 via IT system, this study result suggests that the service of registration for the IPA 40 via IT system which is not hard for the LAOs is instead useful for local people to register via [www.sso.go.th/m40](http://www.sso.go.th/m40) all the time or via a smart phone.

As for aspect 2 : the service of contribution payment for the IPA 40 which has been designed to be available both inside and outside the office, the research result showed that 65 % of community leaders and labor volunteers agreed with having the LAOs provide the service of contribution payment for the IPA 40. (Table 1)

**Table 1** Opinions about the service for contribution payment according to Article 40 through the LAOs

Question	Agree		Disagree	
	Number	Per cent	Number	Per cent
1. What is your opinion if the LAOs (including provincial administrative organizations [PAO], Municipalities, sub-district administrative organizations [SAO]) will provide the service for contribution payment for the IPA 40.	65	83	13	17
2. If the LAOs (including PAO, Municipalities, SAO) will provide the service for contribution payment for the IPA 40 with service fee for 5 baht, do you agree or not?	36	46	42	54
3. If the LAOs (including PAO, Municipalities, SAO) will provide the service for contribution payment for the IPA 40 with service fee for 5 baht, do you agree to use it or not?	66	84	12	16
4. Do you agree or not with the service for contribution payment for the IPA 40 will be that of the LAOs (including PAO, Municipalities, SAO).	61	78	17	22

As for aspect 3: the campaigns, promotion and public relations of the social security according to Article 40, the research result showed that the IPA 40 wanted the SSO to continuously perform public relations of the social security coverage according to Article 40 via television media to create trust and confidence among informal workers / independent employees to register as the IPA 40.

### 3. Integrated Networking of the Services for the IPA 40 between the SSO and the LAOs

Resulting from the synthesized guidelines and the concept of Gusztav Nemes [15], the public administration for doing so has been turned from the Top-down to Bottom-up approach in line with the factual or conceptual integration. Thus, the services for the IPA 40 nationwide are to be done locally by those LAOs in a convenient, fast, economic and satisfactory manner. Nevertheless, improvement of the laws and regulations related to Act on Decentralization Plan and Procedures for the LAOs B.E. 2542 and the use of technology to reduce the process and documents for contacting the government according the cabinet resolution [5] is required to be done. Therefore, the social security services under Article 40 through the LAOs that covers 4 areas are as follows:

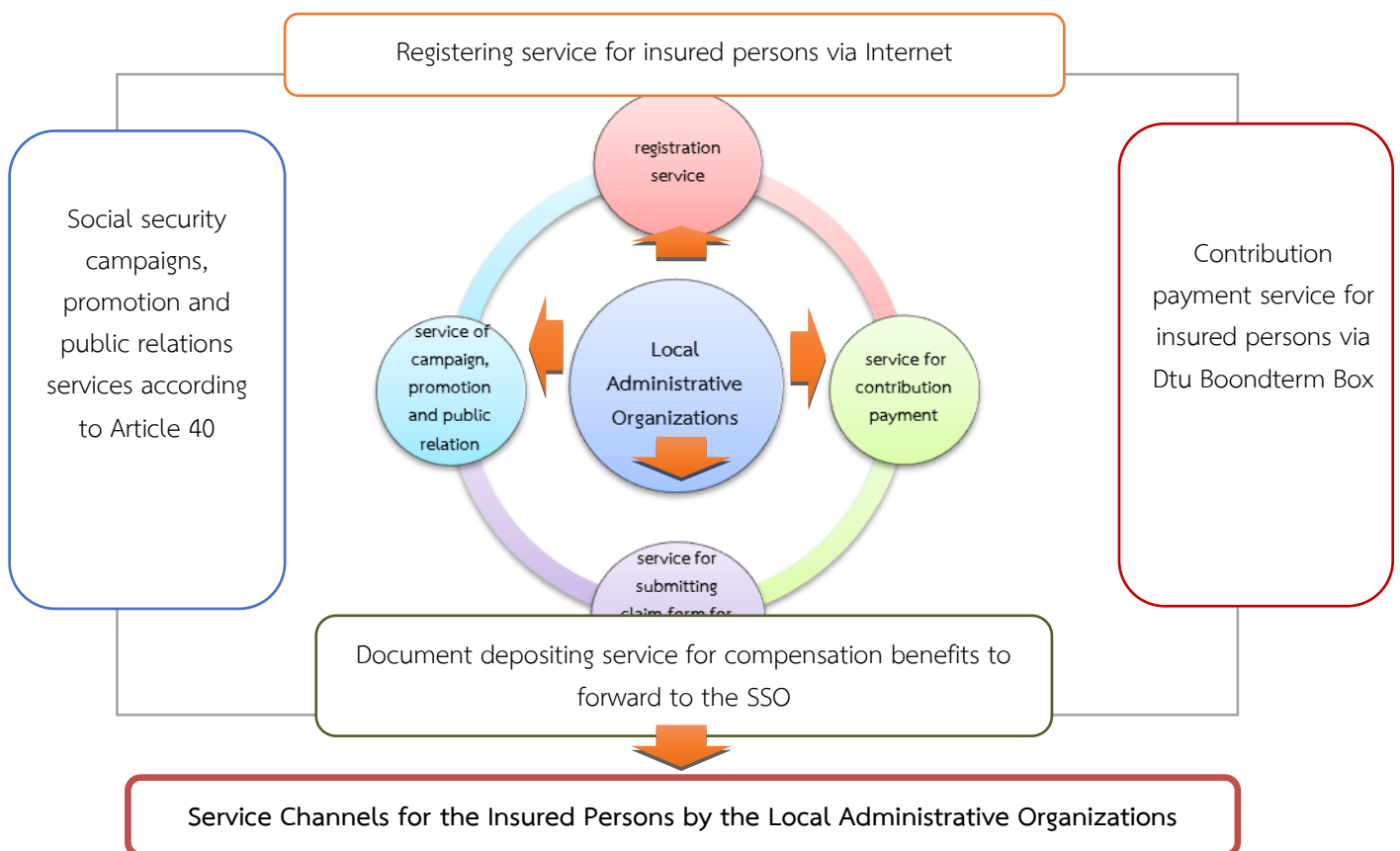
(1) As for the registration of the IPA 40, this can be conveniently integratedly done via the SSO's [www.sso.go.th/m40](http://www.sso.go.th/m40) using the LAOs' personal computers and people's smart phones. Also, it enables people nationwide to access the SSO's services with reduced travel expense.

(2) As for the service of receiving contribution payments from the IPA 40, for the convenience of local IPA 40, the LAOs can be asked for Dtu Boondterm Box built through the cooperation between the SSO and private organizations to be installed at their own offices to receive the contribution payments from the IPA 40 and in doing so, the LAOs will earn fees when the contributions are paid through the Dtu Boondterm Box.

(3) As for the service of receiving documents for compensation benefits to forward to the SSO, the LAOs will receive application forms for compensation benefits from the IPA 40 and forward to local staff of the SSO to consider the request and pay the compensation benefits from the IPA 40.

(4) As for the service of social security campaigns, promotion and public relations according to Article 40, the LAOs will perform the campaigns, promotion and public relations to inform and encourage local people to know and understand the SSO's social security system, and to register as the IPA 40 for entitlement of social security coverage when faced with incidents and dangers, for relief of burden themselves and their families not to fall into a difficult condition such as lack of income from illness or disability, for getting money for funeral if died and for planning to save money for spending when in retirement and reducing the burden of expenses when having children by receiving child allowance etc.

#### Guidelines on Integration of Services for the Self-insured Persons through Local Administrative Organizations



**Figure 1** Guideline on Integration for the Self-insured Persons by the Local Administrative Organizations

## 7. DISCUSSION

Regarding the guidelines for integrating the services-providing cooperation through the LAOs, the researchers discussed the results on 2 issues as follows:

Issue 1 is about the issuance of a notification under the Act of Plan and Procedure Design for Decentralization to Local Administrative Organizations, 1999 [5] to have relevant government agencies including state enterprises and local administrative organizations, etc., responsible for receiving money from the public install electronic payment devices sufficient to provide services to the public; in this regard, this research finding is consistent with that the Office of the Public Sector Development Commission (OPDC) [7] has identified important flagship projects that must have been urgently implemented, especially, the Project to Promote and Develop Excellence in Public Services aiming to encourage government agencies to develop excellent and easily accessible public services.

As for issue 2 about the IT system used in the public services provided for the IPA 40, in this study, it has revealed that they should cover 4 types of services including (1) registering service, (2) contributions payment service, (3) depository documents for compensation benefits under the Social Security Article 40 (4) public relations campaigns of the knowledge of social security coverage, Article 40, at the local level. This study result is in line with the concept of Gusztav Nemes [15], suggesting that the public administration should be done according to the Bottom-up rather than Top-down approach in line with the factual or conceptual integration.

## 8. RECOMMENDATIONS

1. Artificial Intelligence (AI) should be studied and then adopted to design the service system able to link the information of the IPA 40 with various sources so that for example, the AI can detect the case of IPA 40 deaths because its information linked to the Ministry of Interior. The AI can also help to the IPA 40 call for documents or pay compensation benefits and it can reduce the service process and develop the efficient and effective service system for the insured persons.

2. Big Data should be studied and then adopted to develop the staff of the service providers for the IPA 40 and entitled persons in the voluntary social security system under Article 40 to be able to analyze and predict the situation, to plan, and to solve current problems as well as to prevent problems expected to occur in the future.

## REFERENCES

- [1] Social Security Office. 2017. **Number of Self-insured persons under Article 40 Having Already Paid the Contributions**. Bangkok: Research and Development.
- [2] Social Security Office. 2017. **Number of Self-insured persons under Article 40 according to Their Occupations**. Bangkok: Research and Development Division.
- [3] Social Security Office. 2017. **Service Providers Having Service Agreements with the Social Security Office**. Bangkok: Office of Security Strengthening for Informal Labor.
- [4] Social Security Office. 2016. **Number of Self-insured persons under Article 40 Using the Payment Service via Various Channels**. Bangkok: Office of Security Strengthening for Informal Labor.
- [5] The Cabinet Resolution. 2016. **Guidelines to Support the Implementation of the National e-Payment Master Plan, dated 28<sup>th</sup> June 2016**. Retrieved 30 June, 201, from [www.ryt9.com/s/prg/2453877](http://www.ryt9.com/s/prg/2453877).

- [6] The Secretariat of the House of Representatives. 2015. **Public Management: Electronic Government (e- Government)**. Bangkok: Academic Office, the Secretariat of the House of Representatives.
- [7] The Public Sector Development Commission, Office of. 2013. **Strategic Plan for the Development of the Thai Bureaucratic System (2013-2018)**. Bangkok: Vision Print and Media Co. Ltd.
- [8] Information and Communication, Ministry of. 2010. **A Manual of Standardization for Electronic Data Integration among Government Agencies**. Bangkok: Ministry of Information and Communication.
- [9] Groundwater Resources, Department of. 2015. **The 3<sup>rd</sup> ICT Master Plan Development Project for 2016 - 2019**. Bangkok: Department of Groundwater Resources.
- [10] Kamnoonwat, Banyat. 2016. **Digital Government Development Direction**. KomChad Luek newspaper, Wednesday 7<sup>th</sup> December 2016.
- [11] Royal Thai Government Gazette. 1999. **Act on Decentralization Plan and Procedures for the LAOs B.E. 2542**. volume 116, part 114a. Dated 17<sup>th</sup> November 1999.
- [12] Venkatesh, V. 1999. "Creating Favorable User Perceptions: Exploring the Role of Intrinsic Motivation". **MIS Quarterly**. 23(2): 239-260.
- [13] Eagly, A. H., and Chaiken, S. 1993. **The psychology of attitudes**. New York: Harcourt, Brace and Janovich.
- [14] Royal Thai Government Gazette. 2012. **Social Security Committee's Regulations on Funds, Payments and Funds Storage 2012**. Volume 129, Special Section 334 Ngor, dated February 13, 2012; 10-22.
- [15] Gusztáv NEMES. 2005. **MTA Közgazdaságtudományi Intézet**. Budapest: Budaörsi u.



## Agricultural Education Program with Required Competences through Teaching-Learning Experiences

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### ABSTRACT

The study aimed to determine the effectiveness of the King Mongkut's Institute of Technology Ladkrabang (KMITL) professional agricultural education program on the students' teaching-learning experiences. A total of 166 students were surveyed to identify their knowledge, skills and emotional competences, level of preparedness, influencing factors necessary in student education internship particularly on student roles and responsibilities and teacher-supervisor responsibility under the three sub-programs in agricultural education. Research data were analyzed and interpreted using frequency, percentages, and ranking based on student participation and teacher involvement in the agricultural education through the teaching-learning activities. The results were found that the students possess three important competency factors; namely: emotional, physical and mental skills necessary in enhancing their capacities in agricultural education internship program. Positive traits such as loyalty, honesty, humility, trustworthiness, punctuality and values time are important to students during the internship program. Dishonesty, tardiness, quarrelsome, and irresponsibility are the negative traits that students unlike to possess. Understanding the student "self", university policies, teacher's roles and responsibilities complement in making the student more professional in the future as they undergo the different phases of the KMITL agricultural education courses and the internship program. Theoretical implication of the research showed that the KMITL agricultural education-internship program is an evolving systematic process that supports integrated teaching-learning approach into more responsive, innovative and dynamic mechanism enhancing professionalism based on student competencies, level of preparedness, ethics, value system, policies and roles of teacher-supervisors. Providing the appropriate activities and supporting further with experiences will boost and improve the student's competences in teaching agriculture. This paper tries to enhance the student become more professional in the future as they undergo the different phases of the KMITL agricultural education courses and the internship program.

**Keywords:** Agricultural Education Internship, Traits and Characteristics, Teaching-Learning Experiences, Competences, Professionalizing Teachers, Technical Knowledge and Skills

## 1. INTRODUCTION

Professional teacher education programs are considered the best avenue in developing the students' technical knowledge acquisition and skills enhancement for future competent teachers [1]. According to Poplin [2], the responsibility of schools is to enhance the teaching-learning process by helping students develop new meanings in response to new experiences rather than to learn the meanings others have created and for some immersing students to basic theoretical and practical experiences [3] in the teaching-learning environment is best achieved.

Agriculture is the main source of social and economic development in most countries; agricultural education program in all levels include agricultural activities [4] [5] as necessary. In particular, teacher education program that visualizes reality for a stable and concrete actualization of technical education like agriculture [6] and engineering [7], appreciation and involvement are attained.

In Thailand, agriculture is viewed as the most sustainable factor towards progressive, competitive and globalized economy supported by institutions like the Ministry of Agriculture and Cooperatives, and Bank for Agriculture and Agricultural Cooperatives. The King Mongkut's Institute of Technology Ladkrabang (KMITL) professional education program is one of the longest running preparatory programs supporting the country's agricultural education and development [8]. Through its intensive courses, the competencies, skills level and attitudes of students and teachers including its implementation support the effectiveness and efficiency in professionalism [9].

While many believe that teachers do not have the tag of professionalism as any other professionals, in contrary, teachers are singled out as key factor in directing student success attributed by the activities employed that remains labelled as "effective" and "professional teaching"[10]. In so doing, the student's ability to grasp the qualities and develop competencies result in attaining educational goals and becoming professionals in the future [9].

On the other hand, the preparation in developing competent and effective future teachers are dependent on the several factors as studied by educators and researchers [10] [11] [12] [13] [14] [15]. Most studied focused on specific characteristics and traits which have bearing on the development of competent teachers like quality of practice [16] technical integrity including beliefs and philosophical practices [17]; Hurst and Reding [18] on behaviours including appearance, punctuality and building strong relationships; Stronge [19] on the complexity, communicating clearly [3] and serving conscientiously; personal identity and perception of self [20] [21] and including hands on teaching technology by Strong, Harden and Carter [22] were considered necessary in preparing future teachers and maintaining professional identity.

In addition, Darling-Hammond [23] pointed out that schools should have highly qualified teachers to support the teaching-learning process in an integrated manner [24] for the students. Beliefs [25]; emotional experiences [26] whether positive or negative emotional experiences [27] [28] incorporating self-identity in designing teaching-learning activities focused on honesty, intuitiveness and perseverance in an integrated professional education program.

In view of this, the KMITL agricultural education-internship program is enhanced as it evolves into more responsive, innovative and dynamic mechanism supporting the aspect of professionalism based on student competencies, level of preparedness, ethics, value system, policies and roles of teacher-supervisors.

## 2. RESEARCH QUESTION

How is the teaching-learning process contributes in professionalizing agricultural education program?

## 3. RESEARCH OBJECTIVE

- 1) Identify the student's competences, roles and responsibilities during the education-internship period;
- 2) Determine the influencing factors in the agricultural education internship in relation to attaining student identity and professionalism; and
- 3) Analyse the agricultural education-internship program according to its implementation, student participation, teaching-learning environment and teacher-supervisor responsibility and accountability towards student identity and professionalism.

## 4. METHODOLOGY

The study was conducted for a period of three months using an administered structured questionnaire for the students and checklist of guide questions for the faculty of the agricultural education department to determine their views in improving the professionalism of the plant production technology, animal production technology and agro-industry sub-programs.

One hundred sixty-six (166) students were surveyed to identify the knowledge, skills and emotional competencies, level of preparedness, influencing factors necessary in student education internship, and the student roles and responsibilities and teacher-supervisor responsibility. Majority of them are males (125 or 75.30%) and the rest are female with 24.70%. The students are from third year (62 or 37.40%), fourth year (64 or 38.60%) and fifth year (40 or 24.10%). The students specialize in plant production technology (68 or 42%); animal production technology (59 or 35.6%), and agro-industrial technology (39 or 23.5%). Data collected were analyzed and interpreted based on student participation and teacher involvement in the teaching-learning processes in relation to the professionalism of the agricultural education activities.

## 5. RESULTS AND DISCUSSION

### 5.1 Identified Student Competences

The identified competencies, which includes technical knowledge and skills, based on the agricultural education (AE) students show that mental preparedness is highest rated with 84.30% as identified by 140 students followed by skilfully prepared and technically equipped with 82.50% as identified by 137 students and emotionally prepared with 81.30% as identified by 135 students. The least is physically prepared with 64.50% as identified by 107 students. The results show that the four competencies should be viewed collectively in order to enhance the student's capacity towards professionalism in agricultural education.

The KMITL AE students believed that these are properly provided during the fourth and fifth years when they are exposed to actual field practice in applying the lessons learned and experiences in their sub-programs. The students' insight is supported by the study of Hoyle [16], Javeri [17] and Hurst and Reding [18] when the things learned are applied in practice with technical integrity and behaviours. Accordingly, other students clarified that these competencies should not be separated or stand alone but integrated holistically for student development.

Furthermore, the findings were supported by the works of Chumbley [6] when he pointed out that students should be enrolled in dual major courses to obtain the maximum appreciation of learning agricultural courses in developing the physical, emotional and mental capacities of the students. Also, he noted that the dual-enrolment program have a positive impact on students with rigorous courses and gaining in-depth agriculture knowledge including the teachers job satisfaction because of higher standards, prestige and program reputation.

## **5.2 Technical Knowledge and Skills Requirement in KMITL Agricultural Education Major Sub-Programs**

In support to the KMITL AE student competencies, the technical aspects particularly on the practical skills are strongly agreed by 95 students followed by the 83 students on the basic concepts and perspectives of the agricultural sciences in three major sub-programs. On the other hand, 91 students agree on areas of management and examples/cases for instruction particularly on the technical aspect in agriculture.

These responses are similar to the claims studied by Javeri [17] highlighting the technical integrity including beliefs and philosophical practices necessary in ensuring teacher competence. This further show that in the providing better teaching-learning experiences, KMITL AE sub-programs should focus on the technical merits of the field of study because it is where the students will have the integrity and professionalism as agricultural teachers and educators in the future.

In relation to the technical aspect, the students pointed out that classroom management is required in the teaching-learning environment to obtain ample experiences. Specifically, 102 students strongly agree that lesson plan preparation is necessary requirement in classroom management; 101 students support it with the preparation to engage in daily teaching-learning activities. The least is classroom and field exercises management as 86 students strongly agree.

On the other hand, 64 students simply agree on lesson plan preparation followed by 65 students agreeing on their preparation to engage in daily teaching-learning activities. Such findings, may appear to have direct relationship together because of the kind of professional education courses learned by the students to develop their skill competence. Furthermore, student-teacher relationship and interaction is strongly agreed by 95 students together with the comprehensive topical development and literature presentation when managing classroom teaching-learning activities.

Based on these findings, classroom management is required by the KMITL agricultural education students because they view technical knowledge as well as skills are necessary to enhance their holistic competency. As such teachers are required to discuss and demonstrate these necessary competence to the students whether these are in the agricultural sciences sub-program courses or in the professional education courses.

On a different field, Borrego, Froyd and Hall [7] studied that in order for engineering education students to understand innovations, there should be awareness on the education innovation supported by financial resources, faculty time and attitudes' and student satisfaction and learning for better adoption decisions during teaching-learning experiences. Although noted to have two different education views, the present findings and previous study show that it is important to look at the factors that support the development of the students. Both studies show that the cognitive and affective factors are important including the other external factors that enhance the acquisition of technical knowledge and skills by students during the teaching-learning activities and experiences.

### 5.3 Technical Knowledge and Skills Requirement of KMITL Students in undergoing the Agricultural Education and Internship Program

Sixty-eight (68) plant production technology (PPT) students pointed out that specific technological skills are necessarily required to develop their competence. These include plant propagation techniques (54 students) including mushroom (53 students), ornamental plant production (52 students), pest control management technology (51 students), plant breeding technology and flowering plant production (50 students).

Nursery management is the least as identified by the PPT five (5) students followed by 38 students who agreed on land preparation and utilization technology. Three students disagreed and identified each particularly on nursery management, hydroponics crop techniques and plant tissue culture as the least required in the teaching-learning experiences related to the development of student competencies. Also, repair of agricultural equipment and machinery and integrated agriculture were simply agreed requirement to enhance student PPT technical skills with one each.

Derived from the results as identified by the PPT students, the basic technical knowledge and skills should include plant propagation techniques, pest control management, plant breeding technologies and crop economics and marketing. Such results show that these are also the required knowledge and skills competence necessary in the development of students during their teaching-learning experiences and activities. In view of this, teachers should further provide more cases and examples for the students to be better equipped in undergoing the educational internship program.

Parr and Edwards [29] studied that making a choice in learning is worthy to develop the teaching-learning process more exciting. Through their so-called developed method, the inquiry-based learning, it assures the students to acquire the basic knowledge and skills of problem solving techniques while learning the new technologies and innovations in agricultural education. Parr's study proved that this could enhance the method of learning through wise decision in making a choice to learn first as pointed out by the KMITL agricultural education PPT students.

Under the animal production technology (APT) sub-program, the 59 APT students identified different required technical knowledge and skills necessary in undergoing the KMITL agricultural education and internship program. They pointed out that commercial swine production (43 strongly agree), commercial poultry meat production (41 strongly agree), animal nutrition (41 strongly agree) as the top three responses followed by animal growth and development, animal biotechnology production, animal feed manufacturing technology, beef cattle and buffalo production, and commercial ornamental fish culture with 40 strongly agree responses each. It could be noted that such responses were high because of the KMITL agricultural education faculty with very strong technical expertise in animal sciences. Animal sanitation was identified the least with one each for agree and strongly agree responses.

On the other hand, animal product processing technology, commercial production and processing technology of selected amphibians and reptiles, inland aquaculture and domestic animal behavior got 2 disagree responses each by the APT students because they believe these are not required. The responses may be attributed to the less exposure of the students in understanding the technical knowledge and skills attached because of their high regard to protection and conservation of animal welfare and rights.

In addition, animal production technology courses are more likely to have triggered interest, utilization and application of technologies because students were more excited and challenged as far as the teaching-learning experiences because more time were spent with different teachers during course work. However, the students pointed out that they have limited laboratory exercises for field application compared to the PPT students. Nonetheless, it is interesting to note that both sub-programs are comparable in terms of students' basic technical knowledge and skills in crop and animal science education courses. As revealed by the fourth and fifth year students, these learned courses are the most practical and helpful in their internship and off-campus teaching in various educational institutions.

Results show that twenty-eight (28) AIT students strongly agree on the principles of food products development and the utilization of agriculture and agricultural industry residues as required technical knowledge and skills under the agro-industry technology sub-program. These are followed by food law and standards, food processing and plant sanitation (27 strongly agreed) each by students and principles of nutrition (26 strongly agree) and food microbiology and beverage technology (25 strongly agreed). Results show that the basics aspects were the same items identified in agro-industry by the students.

On the other hand, computerization of agricultural industry, dairy and fishery products technology, and standards and quality control of food products were identified as the least required technical knowledge and skills under the sub-program.

#### **5.4 Classroom Management Requirements in enhancing the Teaching-Learning Experiences of KMITL Agricultural Education Students**

Preparation of lesson plan (125 students strongly agree) and teaching material preparation (122 students strongly agree) are considered the highest in terms of the requirements of classroom management in enhancing the teaching-learning experiences of the KMITL agricultural education students. These are followed by student-student behavior management and student assignment and field exercises with 116 strongly agree responses each. Classroom cleanliness and order is the lowest with 92 strongly agree responses by the students.

Furthermore, the students claimed even with the necessary requirements in classroom management, they felt that proper exposure both in theory and practice during the entire duration of the teaching-learning experiences should be done in a participatory manner by them with their teachers.

These findings were supported by the studies of Bok [30] on the how students learn and why they should learn more. He pointed out that is it necessary to know important areas such as writing, critical thinking, quantitative skills and moral reasoning to improve student competencies. At the same time, the students should be prepared with substantial progress in speaking a foreign language, acquiring cultural and aesthetic interest or learning what they need to know to become active and informed citizens. However, he further found out that even with ample resources and new technologies, courses are taught to students differently some fifty years ago where their learning are limited because of the kind and teacher skills which hamper the students' teaching-learning experiences.

#### **5.5 Requirements of KMITL Students to undergo for the Agricultural Education Internship Program**

The student's development is an important aspect in relation to engaging them to undergo to the internship program. Specifically, emotional preparedness is required particularly respect the teacher-mentors (supervisors) at all times (135), Practice and maintain at all times harmonious relationship with supervisor (teacher-mentor) (132), value of the chosen profession (131), conduct myself based on the principles and ideals of a KMITL intern and as a respected individual (129), practice self-control on situation that affects my

identity, integrity and dignity, and respect and be accountable of actions, behaviour in the classroom, field and internship program at all times (127). The aspects were identified as the students believed were necessary because in terms of their emotional stability and behaviour.

However, it is very surprising to note that maintaining self-confidence at all times (98) was the least. When asked to clarify this, the students pointed out that this could be enhanced because of the teacher's assistance while learning and understanding the different technical knowledge and skills. At the same time, they shared that these could be learned through time as they mature and experience the different teaching-learning activities at KMITL and the internship program.

The study conducted by Nichols, Schutz, Rogers and Bilica [31] pointed out that the model of "identity-work" wherein the teachers' engagement resulted to a reflective process of understanding themselves strongly support the present study in addressing emotional aspects in the activities to improve the identities including beliefs and some identity adjustments.

Furthermore, the study shows that physical traits and characteristics such as dressing neat and looking good is necessary to the student as well as the time they are engaged during their educational internship program. This is followed by proper posture and conduct in appropriate manner when walking, sitting, standing and communicating. However, there is a difference in terms of the students' being active, alert and physical presence at all time (Table 1).

**Table 1.** Required Physical Traits and Characteristics of KMITL students to undergo agricultural education internship program.

Required Physical Traits and Characteristics	To Self (Ranking 1-4)	To Education Internship Program (Ranking 1-4)
dressing neat and looking good	1	1
proper posture and conduct in appropriate manner when walking, sitting, standing and communicating	2	2
active, alertness and physically present all the time	3	4
dressing appropriately in any education and work-internship related activities	4	3

Accordingly, the students emphasized that these physical attributes to one-self are important which should be maintained and practiced more during the actual teaching-learning experiences and activities in the university, in the internships institutions they will be assigned and the off-campus teaching assignments.

#### 5.6 KMITL Students Traits necessary during the Agricultural Education Internship Program

Aside from the emotional preparedness and physical attributes of the KMITL students, they have identified very important positive traits to be enhanced "to self" and should have during the agricultural education internship program. Results show that loyalty, honesty and humility as the first group traits a student should possess (Rank 1) followed by being punctual and values time (Rank 2) and trustworthy (Rank 3). The last is being creative, artistic and imaginative (Rank 10). On the other hand, the students pointed out that they must be punctual and value time (Rank 1) followed by loyalty, honesty and humility (Rank 2) and the last is the same as "to-self" during the educational internship program as shown in Table 2. Accordingly, these positive traits are necessary as the students undergo the teaching-learning experiences; they learn through the different activities shared by the KMITL teachers. They stressed that they were given pointers and exercises that enhances these positive traits necessary in becoming a good student teacher and future teacher.

On the other hand, the negative traits identified by the students include dishonesty (Rank 1), selfish (Rank 2), quarrelsome (Rank 3) and the last is tardiness and not punctual. This result support the earlier positive result that punctuality and value of time is an important trait to self. In relation to the education and internship program, students ranked irresponsible as Top 1 followed by dishonesty (Rank 2) and tardiness and not punctual (Rank 3). The last is no self-confidence (Rank 12) as shown in Table 3.

**Table 2.** Identified positive traits of KMITL student necessary to self and must have during the agricultural education internship program.

Identified positive traits	To Self (Rank 1-10)	To Education Internship Program (Ranking 1-10)
Loyalty, honesty and humility	1	2
Punctual and values time	2	1
Trustworthy	3	3
Industrious, obedient and helpful	4	4
Willing to learn and open-mindedness	5	5
Friendly and maintains good relationship	6	8
Realistic, pleasant disposition, cheerful and happy	7	6
Courteous, polite	8	9
Cultured and well-manned (practice the “Thainess”	9	7
Creative, artistic and imaginative	10	10

**Table 3.** Identified negative traits of KMITL student not to have to self and during the agricultural education internship program

Identified negative traits	To Self (Rank 1-12)	To Education Internship Program (Rank 1-12)
Dishonesty	1	2
Selfish	2	5
Quarrelsome	3	6
Impolite/Uncourteous	4	8
Unfriendly	5	9
Arrogant, rude and bossy	6	7
irresponsible	7	1
no self-confidence	8	12
Malicious	9	11
Self-centered and impulsive	10	10
Laziness	11	4
Tardiness and not punctual	12	3

Such findings show that the students believed that it is important to have good positive traits which could be enhanced during the teaching-learning experiences with the KMITL agricultural education teachers and be useful when they will be engaged and undergo the education and internship program in the coming years as they progressed in their academic years. Moreover, the students stressed that positive traits should be maintained and enhanced further to overcome the negative traits seen or perceived that may arise during the teaching-learning activities. In so doing, the students mentioned that they should continue to learn and acquire the best positive traits necessary in becoming a good teacher which could also be practiced during the actual education and internship programs in the coming years of their teaching-learning experiences and activities.



The findings are supported by the studies conducted by Yuan and Lee [32] on student-teacher emotional attributes vis-à-vis teacher identity and positive emotions which led to the motivation to be better and encourage professional learning and teaching; Pillen, Beijard and den Brok [33] studies on the negative attributes and traits of teachers limit the openness and pleasant condition in teaching-learning environment for the students especially if there are tensions of negativity like feelings of helplessness, anger or an awareness of shortcomings.

#### 5.7 Roles and Responsibilities of KMITL Students in relation to the Agricultural Education Internship Program

As shown in Table 4, the agricultural education students identified three phases of their teaching-learning experiences where roles and responsibilities are important. These are part of the “before- during-after” the experiences. Specifically, the students pointed out that “before”, which is during their third year, they undergo and subject themselves in actual experiences to include roles and responsibilities on practice courtesy, honesty, politeness, respect at all times to classmates/co-interns, and supervisors including the teachers/mentors (Rank 1), understand the KMITL Education/Internship Program Policies (Rank 2), and maintain the identity, integrity and dignity of the SELF and KMITL (Rank 3).

**Table 4.** Roles and Responsibilities of students before-during-after the KMITL Education/Internship Program.

Before	Rank (1-8)	During	Rank (1-7)	After	Rank (1-6)
Practice courtesy, honesty, politeness, respect at all times to classmates/co-interns, supervisors (teachers-mentors)	1	Maintain balance and proper decorum inside and outside the classroom	6	Apply knowledge acquires, skills gained, and experiences in future job	2
Understand the KMITL Education/Internship Program Policies and Guidelines	2	Follow the KMITL Education/Internship Program Policies and Guidelines	1	Assess the KMITL Education/Internship Program Policies and Guidelines according to relevance and actual practice	1
Maintain the identity, integrity and dignity of the SELF and KMITL	3	Responsible and accountable of actions, attitude and behavior to students, co-interns and supervisors	3	Evaluate the SELF and KMITL Education/Internship Program based on overall “Thainess” Culture	5
Present the SELF as professional as possible	4	Practice and follow the teaching profession principles and ideals	2	Evaluate to improve the KMITL Education/ Internship Program	4
Acquire the complete and appropriate knowledge (innovation and technologies) and necessary skills in teaching	5	Apply the knowledge and skills of the field of specialization	4	Evaluate the knowledge and skills according to utilization and exchange	3
Conscious in valuing and respecting time of others	6	Practice fairness and unbiased judgments in student activities	7		

Table 4. Continued from previous page

Before	Rank (1-8)	During	Rank (1-7)	After	Rank (1-6)
Engage in activities that enhances the development of the SELF	7				
Prepare SELF to the challenges, issues and concerns to be encountered	8	Act/decide objectively for the good of the student, supervisor, T-L environment	5	Reflect and examine the SELF in relation to the overall the KMITL Education/Internship Program	6

These findings show that the students rely mostly on the teacher's capacity which helps them to practice a direct relationship with what the teachers show. Also, the students focus on teacher-student, student-student and intern-supervisor relationships which support the overall process of teaching-learning experiences.

During the middle phase, which is noted to be in the fourth year of teaching-learning experiences, the student identified follow the KMITL Education/Internship Program Policies and Guidelines (Rank 1), practice and follow the teaching profession principles and ideals (Rank 2), and responsible and accountable of actions, attitude and behavior to students, co-interns and supervisors (Rank 3).

There is a slight change on the focus of roles and responsibilities "during" this phase because of the combination of understanding and reflecting on the theory vis-à-vis the practice. The students are subjected with more intense and specific actual experiences which complement the teaching-learning experiences. The actual in-campus and team teaching exercises enhance and redirect the teaching-learning activities of the students enabling them to adjust their traits and characteristics.

Finally, the "after" phase is observed during the fifth year where practice teaching was completed to real case scenarios. As noted, the students mentioned that they need to assess the KMITL Education/Internship Program Policies and Guidelines according to relevance and actual practice (Rank 1) in order to suggest corrective actions and provide improvements to the program; apply knowledge acquires, skills gained, and experiences in future job (Rank 2); and evaluate the knowledge and skills according to utilization and exchange (Rank 3).

These results show that it is important for the students to understand clearly the KMITL education and internship policies in order for them to conduct themselves properly and avoid any negative behavior during their actual off-campus experiences which determines their life after KMITL. In addition, it was emphasized that the role on the applying what they learned at KMILT is best shown during the actual off-campus teaching because of real teacher-student encounters, teacher-supervisor mentoring and student-teacher relationships.

Furthermore, the students pointed out that before and during their teaching-learning experiences, they should be provided with actual cases and shared experiences in order that they could refine their roles and do better as responsible students and future teachers. At the same time, with constant supervision and mentoring through evaluation and monitoring, the students believed that after their actual internship (off-campus) program, it helped them become better students and future teachers because of the experiences, knowledge and skills gained during the teaching-learning process. The students affirmed further that the final year of their experience led them to improve and change for the better as they will be exposed to the

realities of an agriculture teacher and the teaching profession. It is therefore, necessary that KMITL teacher-supervisors should provide the necessary teaching-learning experiences in the university to the fullest from the early as part of the regular teaching activities until the final days of student KMITL and field practicums.

#### **5.8 The Agricultural Education Internship Program in relation to Student Identity and Professionalism**

The King Mongkut's Institute of Technology Ladkrabang – Agricultural Education Internship Program (KMITL-AEIP) is a combination of technical agriculture knowledge and education principles supported by practical application of cases and skills. The program which has been running for years showed that the students undergoing the teaching-learning processes gain the much needed experiences to equip them to be effective and efficient agriculture teachers.

This has been proven by the kind of students selected and identified to specialize in the three sub-programs in agricultural education, namely plant production, animal production and agro-industrial technologies. The courses under the sub-programs are provided to the students to develop their technical knowledge and skills in their chosen field where they can confidently enhance through practical application of the technologies in agriculture as well as the educational strategies required of during the student-teacher preparation.

Accordingly, the students pass through a series of evaluations and activities that determine their capabilities and capacities as future teachers. These are highlighted during the regular activities especially during laboratory exercises with the teachers providing the guidance and training. As such, it is believed that the program is well implemented according to the needs of the students both in-campus and off-campus. In addition, the teachers have encouraged the students to be dependent to work based on the motivations provided supported by the teacher's passion and responsibility to teach whole heartedly through the years. These insightful comments and points were raised by the students about the KMITL-AEIP and their teachers resulted to describe the program as presently effective and efficient given the technical resources and preparations provided to the students.

#### **CONCLUSION**

The student competences are very important in undergoing any educational activities whether in crops, animal and agro-industry related activities. In order to be effective and efficient in the process, these should be enhanced to develop further the student's attitude towards professionalism in the agricultural education program and in the teaching profession in the future.

The identified knowledge and skills of the students resulted to the improvement and intensification of the KMITL-AEIP to the fullest, given the teachers' technical specialization and interventions in the teaching-learning activities. The emotional, physical and mental capacities of the students are necessary both to the students and the internship program. These must be provided with appropriate activities and supported further with experiences that will boost and improve the student's competences in teaching agriculture. Understanding the student "self", university policies, teacher's roles and responsibilities complement in making the student more professional in the future as they undergo the different phases of the KMITL agricultural education courses and the internship program.

## REFERENCES

- [1] Creasy, K. L. 2015. "Defining Professionalism in Teacher Education Programs." *Journal of Education and Social Policy* 2(2): 23.
- [2] Poplin, M. S. 1988. "Holistic/Constructivist Principles of the Teaching/Learning Process: Implications for the Field of Learning Disabilities." *Journal of Learning Disabilities* 21(7): 401-416.
- [3] Kramer, P. 2003. "The ABC's of professionalism." *Kappa Delta Pi Record* 40(1): 22-25.
- [4] Sin-Ae Park, et.al. 2016. "Horticultural Activity Program for Improving Emotional Intelligence, Pro-social Behavior, and Scientific Investigation Abilities and Attitudes in Kindergarteners." *HortTechnology* 26(754-761).
- [5] Coelho, D.E.P and C. M. Bogus. 2016. "Experiences of growing and eating: school gardens as educational practice, from educators' perspective." *Saude e Sociedade* 25(3). July/September 2016.
- [6] Chumbley S.B. 2016. "The Impact of a Career and Technology Education Program." *SAGE Open*. October-December 2016: 1-9. Doi: 10.1177/2158244016678036
- [7] Borrego, M., J.E. Froyd and T.S. Hall. 2010. "Diffusion of engineering education innovations: A survey of awareness and adoption rates in U.S. engineering departments." *Journal of Engineering Education* 99(3): 185-207.
- [8] Faculty of Industrial Education, KMITL. 2011. "Bachelor of Science in Industrial Education Program in Agricultural Education (Version 2011)." KMITL, Ladkrabang, Thailand.
- [9] Tichenor, M.S. and J.M. Tichenor. 2005. "Understanding Teachers' Perspectives on Professionalism." *The Professional Educator*. 17(1 & 2): 89-95.
- [10] Stronge, J., & Tucker, P. 2000. *Teacher evaluation and student achievement*. National Education Association, Washington, DC, USA.
- [11] Wise, A. 1989. "Professional teaching: A new paradigm for the management of education." In T. J. Sergiovanni & J. H. Moore (Eds.), *Schooling for tomorrow* Allyn and Bacon, Boston.
- [12] Hugh S. 1993. *The Moral Base for Teacher Professionalism (Professional Ethics in Education)* Hardcover – March, 1993. Teachers College Printers, USA.
- [13] Seifert, K. L. 1999. *Constructing a Psychology of Teaching and Learning*. Houghton Mifflin Company, Boston, MA . USA.
- [14] Cruickshank, D., and Haefele, D. 2001. "Good teachers, plural." *Educational Leadership* 58(5): 26-30.
- [15] Clement, L. 2002. "Welcome to a profession." *New Teacher Advocate* 10(2): 4.
- [16] Hoyle, E. 1980. *Professionalization and deprofessionalization in education*. In E. Hoyle & J. E. Meggary (Eds.), *The professional development of teachers* (pp. 42-57): Kogan Page, London, England.
- [17] Javeri, M. 2002. *Technology Integration: Best Practices in Higher Education*. In the Proceedings of the International Conference on Computers in Education (ICCE'02) University of Northern Colorado.
- [18] Hurst, B., and Reding, G. 2000. *Professionalism in teaching*. Upper Saddle River, Prentice Hall, New Jersey, USA.
- [19] Stronge, J. 2002. *Qualities of effective teachers*. Alexandria, VA: Association for Supervision and Curriculum Development, USA.
- [20] Beijjaard, D., N. Verloop, and J. D. Vermunt. 2000. "Teachers' perceptions of professional identity: an exploratory study from a personal knowledge perspective." *Teaching and Teacher Education* 16: 749-764.

- 
- [21] Beijaard, D., P.C. Meijer and N. Verloop. 2004. "Reconsidering research on teachers' professional identity". *Teaching and Teacher Education* 20: 107–128.
  - [22] Strong, R., A. Harder and H. Carter. 2010. "Agricultural Extension Agents' Perceptions of Effective Teaching Strategies for Adult Learners in the Master Beef Producer Program." *Journal of Extension*. 48(3): 1-7.
  - [23] Darling-Hammond, L. 1996. "The quiet revolution: Rethinking teacher development." *Educational Leadership* 53(6): 4–10.
  - [24] Myers, B.E. S. G. Washburn and J. E. Dyer. 2004. "Assessing Agriculture Teachers' Capacity for Teaching Science Integrated Process Skills." *Journal of Southern Agricultural Education Research* 54(1): 74-85.
  - [25] Knobloch, N. A. 2008. "Factors of teacher beliefs related to integrating agriculture into elementary school classrooms." *Agricultural Human Values* 25:529–539
  - [26] O'Connor, K.E. 2008. "You choose to care': Teachers, emotions and professional identity." *Teaching and Teacher Education* 24: 117–126.
  - [27] Timostsuk, I. and A. Ugaste. 2010. "Student teachers' professional identity." *Teaching and Teacher Education* 26: 1563-1570.
  - [28] Phonpakdee, R. and M. Aquino. 2016. "Design Innovations in Identity Enhancement of Industrial Education Students of the King Mongkut's Institute of Technology Ladkrabang in Thailand." *Romanian Journal of Experimental Applied Psychology* 7(Special Issue 1): 48-51.
  - [29] Parr, B. and M. C. Edwards. 2004. "Inquiry-Based Instruction in Secondary Agricultural Education: Problem-Solving – An Old Friend Revisited." *Journal of Agricultural Education* 45(4): 106 -113. doi: 10.5032/jae.2004.04106.
  - [30] Bok, D. 2009. "Our Underachieving Colleges: A Candid Look at How Much Students Learn and Why They Should Be Learning More." Princeton University Press, New Jersey, United State.
  - [31] Nichols, S.L., P. A. Schutz, K. Rodgers, and K. Bilica. 2017. "Early career teachers' emotion and emerging teacher identities." *Teachers and Teaching* 3(4): 406-421.
  - [32] Yuan, Rui and I. Lee. 2016. "I need to be strong and competent': a narrative inquiry of a student-teacher's emotions and identities in teaching practicum." *Journal Teachers and Teaching Theory and Practice* 22(7): 819-814.
  - [33] Pillen Eindhoven School of Education, Eindhoven University of Technology, Eindhoven, The Netherlands; Windesheim University of Applied Sciences, Zwolle, The Netherlands, M., D. Beijaard and P. den Brok. 2013. "Professional identity tensions of beginning teachers." *Journal Teachers and Teaching theory and practice* 19(6): 660-678.

## An Evaluation of The Desired Characteristics of Students Under The Project of Moral Development in Private School

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### ABSTRACT

This research was to evaluate activities conducted according to the Project of Moral Development (PMD) in private schools in Thailand through self-evaluation by those involved of 3 groups: 1) school administrators 2) teachers attending the trainings and 3) students in those private schools. The quantitative data were gathered from those 729 private schools through 45,000 questionnaires of which 21,380 were returned from 359 private schools and then analyzed. Meanwhile, the qualitative data were collected by the authors through the schools visits, informal talks with those involved, and observations. The results showed that 1) most of the administrators and teachers were satisfied with the PMD, able to carry out activities according to it and wanted to proceed according to it again next year; that 2) the administrators were very satisfied with the physical changes in their schools, the changes of their students' behaviors, the psychological atmosphere among the teachers and students; moreover, they thought that their schools seemed much better in perception of surrounding communities; that 3) the teachers were somehow satisfied with the changes of students interested in pursuing knowledge, doing good, and pursuing health care; that 4) the students perceived that they had more skills in the Thai language, took more care of their own health and behaved more morally; that 5) they also realized that they were likely to morally and reasonably think and make decisions in their daily lives; and that 6) the following suggestions were given : a) The duration of only 3-4 months for organizing the PMD activities was very short so it should be extended at least 1 year before the assessment. b) The PMD's trainings should be provided especially for those school administrators because they play an important role in the development of the moral development system to be successful. c) The private schools should organize regular activities according to the PMD throughout the year for continuous moral development. d) The Office of the Private School Commission (OPEC) should organize a forum for the private schools to exchange experiences in organizing the PMD activities. In addition, e) the OPEC should have a clear policy on the moral development activities to create morale and encouragement for the private schools.

**Keywords:** Evaluation, Characteristics, Moral Development, Private School

## 1. INTRODUCTION

In Thailand, the National Education Act, 1999 and that amended (No. 2), 2002; Section 6 is enacted that “the provision of education shall be for development of Thai people so as to be perfect human beings including body, mind, intelligence, knowledge, and virtue and to have morality and culture in living life and capable of living with other people happily.(this means that being a good person of those around you and of society)” and Section 7 is also enacted that “ a learning process shall aim at instilling a correct conscience relating to politics and administration of a democratic form of government with the King as Head of State, an awareness to protect and promote right, duty, liberty, respect of law, equality, and human dignity, a sense of pride to be Thai, an awareness to protect public and national interest, as well as promoting religious, art, national culture, sport, folk wisdom, Thai wisdom, and universal knowledge, along with preserving natural resources and environment, a capability to make a living, an awareness to be self-reliance, having creativity, longing for knowledge, and self studying on a continuous basis.” In addition, the Ministry of Education (MOE) has set the policy of 3 good things (3Ds) to be instilled among Thai students namely Democracy, Decencies of morality, ethics and Thai-ness, and Drug-free living.

Around 10 years after the proclamation of the National Education Act, 1999; in 2009, results from evaluative studies revealed that some issues had been resolved and successful such as the Office for National Education Standards and Quality Assessment (ONESQA) had been established as a public organization for external quality assurance and accreditation of all levels and types of education. Nevertheless, lots of Thailand’s educational issues were still required to be resolved and improved, for example, quality of students, teachers, administrators and other educational personnel and so on. Therefore, principles, conceptual frameworks, visions, goals, guidelines for the 2<sup>nd</sup> decade of educational reform were reviewed, revised, reset and based on the National Education Act, 1999 and that amended (No. 2), 2002 so as to have a new learning system to promote the lifelong self-learning among learners and to encourage them to have learning habit, to be able to think critically for problem-solving and to have virtue-based knowledge and to learn formal or non-formal education. [1]

Office of the Private Education Commission (OPEC) realized the educational issues, gave the first priority on the policy to promote morality among students and admitted that to instill the morality, virtue and ethics among them takes lots of time however. This is because the OPEC is required to have its all private schools be able to set up the desired characteristics of their students in accordance with their educational philosophies, curricula, standards of internal quality assurance or demands of private sectors; moreover, the desired characteristics should be consistent with the national philosophy of education. Then, the private schools have to organize various activities to promote and to develop the desired characteristics among their students regularly and systematically.

Therefore, the OPEC was required to arrange the Project of Moral Development (PMD) and to evaluate the desired characteristics of students in its educational institutions.

## 2. OBJECTIVE

This study aimed to evaluate the desired characteristics of students in general private schools, those run by special policy and those of vocational education according to the project of moral development.

## 3. DEFINITION

In this study, the desired characteristics refer to the ones to pursue learning, good deeds and health care.

#### 4. LITERATURE REVIEW

The related literature is as follows:

##### 4.1 APPROACHES OF EVALUATION

The approaches of evaluation that are suitable for projects in schools are as follows: [2]

1. Goal – based approach of evaluation assumes that the project's objectives are project evaluation criteria. The assessor will use these objectives to compare with the results from the project; therefore, the success of the project is that there is no or very little difference between the objectives and what the project has actually done.

2. Goal-free approach of evaluation is to evaluate everything resulting from the project and it is not necessary to use the project's objectives as the evaluation criteria because it may cause bias in consideration of the project results or sometimes, the project results may be ignored or the side effects caused by some projects may be overlooked because they are considered as not important.

3. CIPP[Context, Input, Process and Product]-Model-based approach of evaluation (Secretariat Office of the Educational Council, Ministry of Education, 2009) not only assesses whether or not the objective has been achieved but also evaluates for details of the Context, Input, Process and Product to help in making decisions about the project as well. This kind of assessment is popular because assessors will comprehensively know advantages, deficiencies and the effectiveness of the project. In addition, it is very useful to help administrators in decision-making.

An evaluation approach is a directional indicator of what is relevant and what the assessors have to do. Therefore, a selection of it must be in accordance with the needs of the evaluative users.

As for the goal – based approach of evaluation, as follows are the definitions of evaluation by some scholars advocating this goal – based approach:

Tyler [3] defines that the assessment is to examine whether the project outcomes or activities carried out are according to its objectives or not.

Davis, [4] defines that the assessment means the objective examination of the project objectives whether they attain the targets set or not and how well those targets have been achieved.

In conclusion, the above scholars view the evaluation as a process of determining success and failure of a project and how well it is in accordance with the purpose.

##### 4.2 RELATED RESEARCH

As follows are summaries of the research related to this study:

In 2011, Sanga-songkroh [5], who had conducted research on an activity model based on the Buddhist three-fold training for instilling work discipline among production technician students, found that the model based on the Buddhist three-fold training could develop the work discipline among the students.

In 2008, Ongla-or [6], using the CIPP Model, examined the project evaluation of “Rongrian Withee Phut Phong Phud Petch Pathum [The School Following the Buddhist Way in Pathum Village]”. The results from the opinions on enhancement of students' quality and ethics by the study sample consisting of students' parents, students, school board, religious organizations and people in the community, revealed according to the elements of the CIPP Model as follows: In terms of the Context of the readiness of community, school curriculum and teaching and learning management for enhancement of students' quality and ethics was viewed by the sample participants at the high level; in terms of the Inputs of the readiness of educational personnel, administration, curriculum and teaching, school environment, budget, teaching materials and learning sources was viewed by the participants at the moderate level; in terms of the Process, the sample participants viewed that



the curriculum development, and the content together with learning activities which were suitable for the enhancement of students' quality and ethics and were consistent with the Project of the tripartite participation among the village, temple and school for the moral and ethical promotion were at the high level; in terms of the Product, the sample participants viewed that the students' behaviors and empirical performance was at the high level; and finally, in terms of the Impacts, the sample participants viewed that the effects on the school and community, the satisfaction of the parents and community and the dissemination of performance results to other schools were at the high level.

Deemangkorn [7], in 2006, conducted research using the CIPP Model, on "An Assessment of Moral and Ethical Development Programs and Desirable Values of Students at Ban Nong Krathum School (Chan Prachanukroh) under the Office of Ratchaburi Educational Service Area 2" and found that in terms of the Context, the project rationales were consistent with the government policies; the project objectives and goals were clear, comprehensive and suitable for the problems to be resolved and developed; the project activities were appropriate for teachers and students and able to morally and ethically develop the students and the overall Context was rated at the high level. In terms of the Inputs which were composed of educational personnel, budget, materials and the Buddhist-way activities as well as the factors for production of educational materials were overall rated at the high level. In terms of the Process consisting of the Buddhist-way activities, the production process of educational materials and the supplementary activities which were suitable and rated at the high level. In terms of the Products which were found that the students behaved in manners of economy, honesty, order and Thai etiquette were also rated at the high level.

## 5. METHOD

This study was conducted as a survey research where the data of the desired characteristics were both quantitatively and qualitatively collected from private schools under the OPEC.

In the evaluation of the desired characteristics of students under the Project of Moral Development (PMD), there were 3 types of private schools including 1) the private schools of general education, 2) those of special policy and 3) those of vocational education. These 3-type private schools were also divided into 2 groups according to 2 phases of the trainings: phase 1, April – May and phase 1, June – July.

Individuals who provided the data from such schools consisted of 3 groups of people, namely 1) school administrators, 2) teachers who had attended the trainings and 3) students in the classroom chosen to represent each classroom interval as follows: 1<sup>st</sup> interval by a classroom of Por. 3 (or grade 3), 2<sup>nd</sup> interval by a classroom of Por. 6 (or grade 6), 3<sup>rd</sup> interval by a classroom of Mor. 3 (or grade 9), 4<sup>th</sup> interval by a classroom of Mor. 6 (grade 12), 5<sup>th</sup> interval of Por-Wor-Chor (Vocational Education Certificate or grade 10 - 12) by a classroom of Por-Wor-Chor 3 (grade 12), and 6<sup>th</sup> interval of Por-Wor-Sor (Vocational Education Diploma or 2 years more) by a classroom of Por-Wor-Sor 2 (2 years after grade 12) and each classroom representative was composed of 30 students.

Tools for the quantitative data collection were 2 sets of the questionnaires of self-evaluation. The 1<sup>st</sup> set which was used with the group of the private schools attending the phase-1 training was composed of 3 types of the questionnaires used to collect the data from the school administrators, the teachers attending the trainings and the students respectively. However, the 2<sup>nd</sup> set which was used with the group of the private schools attending the phase-2 training consisted of only 2 types of the questionnaires to collect the data from the school administrators and the teachers attending the trainings.

As for the qualitative data collection, some of the authors visited some of the private schools involved in this study and had observations and talks with those involved in PMD.

As for the quantitative data collection, 45,000 sets of the questionnaire were mailed to 729 private schools. When they were returned, they were examined for its completeness for use. Then, there were 21,380 sets usable for data analyses. Its details are as follows:

1) The questionnaires were sent by mail to each school to collect data from the school administrators and teachers who had attended the trainings and students representing each class interval of the three- type private schools, namely, those of general education, those of special policy and those of vocational education. The researcher sent the questionnaires in 2 phases according to the time of the training programs. Details are as in Table 1

**Table 1** Number of the Mailed Questionnaires

Training Phases	Number of the Mailed Questionnaires (according to school types)			Total
	General education	Run by special policy	Vocational education	
Phase 1 (from April to May)	220	160	194	574
Phase 2 ( from June to July)	148	5	2	155
<b>Total</b>	<b>368</b>	<b>165</b>	<b>196</b>	<b>729</b>

Among 729 private schools which had received the questionnaires, only 436 private schools returned them. When the authors had examined their completeness of them, 77 schools were found that they returned the questionnaires later than the date due. Details are as in Table 2

**Table 2** Number of the Returned Questionnaires

School types	Number of the Returned Questionnaires (according to school types)		
	In time	Later	Total (including both types)
General education	216	23	239
Run by special policy	56	18	74
Vocational education	87	36	123
<b>Total</b>	<b>359</b>	<b>77</b>	<b>436</b>

2) As for the qualitative data from the private schools which participated in the PMD, they were collected through observations and informal interviews with school administrators and teachers attending the Project trainings and their students when the authors visited the private schools including 3 schools of general education and 5 of vocational education.

## 6. RESULTS

The findings were summarized as follows:

1) Majority of administrators and teachers from 3 types of the private schools were satisfied with the project of moral development provided in the trainings by the OPEC; they took the system to be implemented in their schools. (Table 3)

2) The school administrators were very satisfied with the changes after the PMD. For example, in views of neighboring communities, the schools' images had improved; the physical conditions of the schools had also improved and the students had changed their behaviors in a better way, etc. (Table 4)

3) The teachers were fairly satisfied with the changes among students after the Project. For example, some students were able to critically think based moral reasons, to practice meditation and to have physical exercise. (Table 5)

4) The students perceived that their abilities in Thai improved: better reading, more communicable speaking, more effective writing and more efficient listening. The students perceived that they sometimes they thought and made decisions based on morality. The students perceived that they themselves had practically changed a habit about health care; thus, they took health care of themselves more regularly. (Table 6)

**Table 3** Basic data and satisfaction with the moral development projects in the private schools based on the opinions of administrators and teachers

Types of the private schools	Personnel	Phase	Gender		Years of Experience	Project satisfaction			Project operational feasibility		
			Male	Female		lots of	fair	less	possible	Hard to be done	Impossible
General education	Administrators	1	93 (23.6)	107 (76.4)	$\bar{X}$ = 11.80 years S = 8.64 years	122 (87.1)	18 (12.9)	-	126 (94.7)	7 (5.3)	-
		2	15 (20.0)	60 (80.0)	$\bar{X}$ = 12.93 years S = 9.69 years	69 (92.0)	6 (8.0)	-	70 (94.6)	4 (5.4)	-
	Teachers	1	160 (18.1)	722 (81.9)	$\bar{X}$ = 11.16 years S = 8.95 years	736 (84.9)	119 (13.7)	12 (1.4)	746 (91.6)	47 (5.8)	21 (2.6)
		2	86 (18.5)	380 (81.5)	$\bar{X}$ = 12.23 years S=10.13 years	420 (89.7)	45 (9.6)	3 (0.6)	415 (89.1)	48 (10.3)	3 (0.6)
Run by special policy	Administrators	1	34 (61.8)	21 (38.2)	$\bar{X}$ = 7.02 years S = 5.67 years	41 (74.6)	12 (21.8)	2 (3.6)	46 (83.6)	9 (16.4)	-
		2	1 (100.0)	-	$\bar{X}$ = 4.00 years S = 0.00 years	1 (100.0)	-	-	1 (100.0)	-	-
	Teachers	1	137 (40.3)	203 (59.7)	$\bar{X}$ = 4.90 years S = 4.91 years	235 (70.8)	87 (26.2)	10 (13.0)	271 (86.3)	33 (10.5)	10 (3.2)
		2	4 (100.0)	-	$\bar{X}$ = 2.25 years S = 1.89 years	2 (50.0)	2 (50.0)	-	4 (100.0)	-	-

**Table 3** Basic data and satisfaction with the moral development projects in the private schools based on the opinions of administrators and teachers

Types of the private schools	Personnel	Phase	Gender		Years of Experience	Project satisfaction			Project operational feasibility		
			Male	Female		lots of	fair	less	possible	Hard to be done	Impossible
Vocational education	Administrators	1	39 (45.9)	46 (54.1)	$\bar{X} = 12.29$ years $S = 9.33$ years	73 (86.9)	11 (13.1)	- -	73 (86.9)	11 (13.1)	- -
		2	1 (50.0)	1 (50.0)	$\bar{X} = 3.50$ years $S = 0.71$ years	2 (100.0)	- -	- -	2 (100.0)	- -	- -
	Teachers	1	198 (35.2)	364 (64.8)	$\bar{X} = 10.28$ years $S = 8.97$ years	452 (80.6)	103 (18.3)	6 (1.1)	452 (83.2)	82 (15.1)	9 (1.7)
		2	6 (75.0)	2 (25.0)	$\bar{X} = 4.88$ years $S = 3.09$ years	8 (100.0)	- -	- -	7 (87.5)	1 (12.5)	- -

Phase 1= being trained from April to May

Phase 2= being trained from June to July

**Table 4** Average means ( $\bar{X}$ ) and standard deviations(S) of administrators' satisfaction with the changes in their schools after the project operation Presented according to types of the private schools

Changes	General education		Run by special policy		Vocational education	
	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
- In views of neighboring communities, the school images had improved.	2.82	0.38	2.63	0.49	2.67	0.47
- The physical conditions of the schools had also improved.	2.84	0.37	2.75	0.44	2.67	0.47
- The student behaviors had positively changed.	2.67	0.47	2.40	0.49	2.43	0.50
- The mental atmosphere of teachers had been better.	2.73	0.45	2.71	0.46	2.68	0.47
- The mental atmosphere of students had been better.	2.79	0.41	2.71	0.46	2.61	0.49
<b>Total</b>	<b>2.77</b>	<b>0.32</b>	<b>2.64</b>	<b>0.31</b>	<b>2.70</b>	<b>0.26</b>

**Table 5** Average means ( $\bar{X}$ ) and standard deviations(S) of teachers' satisfaction with the changes in the desired characteristics of students Presented according to types of the private schools

Changes in the desired characteristics of students	General education		Run by special policy		Vocational education	
	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
- Pursuing learning	2.49	0.51	2.45	0.54	2.39	0.54
- Pursuing good deeds	2.74	0.44	2.33	0.55	2.42	0.57
- Pursuing health care	2.73	0.45	2.68	0.48	2.46	0.60
<b>Total</b>	<b>2.66</b>	<b>0.34</b>	<b>2.49</b>	<b>0.36</b>	<b>2.43</b>	<b>0.45</b>

**Table 6** Average means ( $\bar{X}$ ) and standard deviations (S) of students' opinions about the changes of students' changes in Thai language abilities, moral and ethical reasoning and health care Presented according to types of the private schools

Changes in Thai language abilities and moral and ethical reasoning	General education		Run by special policy		Vocational education	
	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
<b>Thai language abilities</b>						
- Ability to read Thai fluently	2.69	0.48	2.66	0.49	2.58	0.50
- Ability to speak Thai properly	2.64	0.50	2.58	0.52	2.57	0.50
- Ability to write Thai correctly	2.62	0.52	2.65	0.50	2.57	0.51
- Ability to listen to Thai language effectively	2.59	0.52	2.62	0.51	2.58	0.51
<b>Moral and ethical reasoning</b>						
- Ability to think and make decisions based on moral, ethical and reasonable principles.	2.26	0.49	2.33	0.50	2.33	0.50
<b>Health care</b>						
- Exercising	2.40	0.55	2.34	0.54	2.20	0.58
- Eating healthy food	2.60	0.51	2.50	0.54	2.45	0.54
- Adequate rest (sleep)	2.65	0.52	2.59	0.53	2.49	0.58
- Maintaining the cleanliness of the body	2.90	0.31	2.86	0.36	2.89	0.33
- Wearing clean clothes	2.92	0.30	2.89	0.33	2.91	0.30

0.50 - 1.50 = Less satisfaction / Less participation / Less change  
 1.51 - 2.50 = Fair satisfaction / Fair participation / Fair change  
 2.51 - 3.50 = A lot of satisfaction / A lot of participation / A lot of change

## 7. RECOMMENDATIONS

Based on the evaluation of desirable characteristics according to the PMD in the private schools, recommendations from the research results are as follows.

1) The PMD's trainings should be provided especially for those school administrators because they play an important role in the development of the moral development system to be successful.

2) The PMD should be undertaken continuously and regularly because the moral development requires continuity and regularity to be successful.

3) The OPEC should provide a platform for private schools to exchange knowledge and organize moral development activities. Thus, the schools having been successful for good moral development activities are to be selected to present their successes to other schools to learn and then open the platform to exchange knowledge with other schools to get new ideas to apply to their own schools.

4) The OPEC should have a proactive policy focusing on morality, virtue and ethics to create morality-oriented atmosphere at school because majority of private schools under the OPEC have given high priority on the moral development. Therefore, if the OPEC has such a clear policy, it will help the affiliated schools to be encouraged to develop morality further.

## ACKNOWLEDGMENT

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## REFERENCES

- [1] Secretariat Office of the Educational Council, Ministry of Education. 2009. **Educational Reform Proposal in the Second Decade (2009-2018)**. Bangkok: Phrig Waan Graphic Printing Co. Ltd.
- [2] Photisuvan, C. 2000. **Non-formal education: foundation for project planning**. Bangkok: Kasetsart University Press.
- [3] Tyler, R.W. 1969. **Educational evaluation: new roles and means**. Chicago: University of Chicago Press.
- [4] Davis, James. W, Jr. 1974. **An introduction to public administration**. New York: The Free Press Co.
- [5] Sanga-songkroh, K; Wattana, J; and Papatana, S. 2011. **An activity model based on the Buddhist three-fold training for instilling work discipline among production technician students**. Journal of Industrial Education. Vol 10. No 2, 282-289.
- [6] Ongla-or, T. 2008. **A Project Evaluation of “Rongrian Withee Phut Phong Phud Petch Pathum [The School Following the Buddhist Way in PathumVillage]” at Baan Pathum (Thavorn Raat Seuksa) School under the Office of Phrae Educational Service Area 1**. Retrieved 14 Jul, 2008, from <http://surasitkalasin2.com/index>.
- [7] Deemangkorn, T. 2006. **An Assessment of Moral and Ethical Development Programs and Desirable Values of Students at Ban Nong Krathum School (Chan Prachanukroh) under the Office of Ratchaburi Educational Service Area 2**. Retrieved 17 Jul, 2008, from <http://rbr2.net/book/ta.do>.

## Blended Learning Management of WordPress Website Development Skill for Communication Design Undergraduates Using The ADDIE Model

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### ABSTRACT

The purpose of this study was to identify a gap performance of website building skill for the undergraduates at the Department of Communication Design, Faculty of Architecture King Mongkut's Institute of Technology Ladkrabang (KMITL). The researchers applied the ADDIE Model (Branch,2009), a theory of instructional design process that starts from the beginning to an end. It contains five phases: 1) Analysis 2) Design 3) Development 4) Implementation and 5) Evaluation. Enable us to notice what cause the performance gap and how we solve that problem via instructional design and meet assessment learning criteria. This learning management has the following objectives: 1) To develop the Blended Learning instructional plan for Website Development Skill on Communication Design Undergraduates using the ADDIE Model through the short-time workshop training to build Portfolio Website with WordPress. 2) Student can build their own portfolio websites. The overall outcome of the Blended Learning management with the learners' satisfaction towards WordPress website training workshop, for the undergraduates according to ADDIE approach and Likert-Type scale (Likert,1932). It says 1. The learners are satisfied with Online Lesson at mean = 4.32, Instructor at mean = 4.56 and Facilitation at mean = 4.55. 2. The evaluation of the learners' portfolio websites that equal to rubric criteria at (0.00 - 3.00), which mean very good. The average score is 2.47

**Keywords:** ADDIE Model, Blended Learning, WordPress

## 1. INTRODUCTION

A website is a medium that is still popular on the internet and used widely in public including government agencies and private sectors. We can access from anywhere at any time. It is a necessary form of media for disseminating information and identity-creating on a virtual world remotely (Andrasari, 2016. Hu et al., 2014).

Currently, the Department of Communication Design at the Faculty of Architecture King Mongkut's Institute of Technology Ladkrabang (KMITL), provide a website design instructional that aims student be able to create an alluring, contented and effectively communicate to the audience. However, the scope of instructional does not cover the Computer Programming Languages that fundamental to website building. Hence, a performance gap exists even student can design a website but cannot build effectively. Using Content Management Systems: CMSs (Ruth, 2013) in the semi-instant website builder are reduced problems from the previous traditional website builders. It enables the students to build a website without understanding/knowledge of Computer Programming Languages. Thus, WordPress is a choice and widespread use globally including Thailand. It is a free source software that developed using PHP, in conjunction with the database systems such as MySQL.

The WordPress training workshop, for the students at the Department of Communication Design using the ADDIE Model, a theory of instructional design process that starts from the beginning to an end. It contains five phases: 1) Analyze 2) Design 3) Development 4) Implementation 5) Evaluation. Consequently, to know what an actual problem is, occurs at the performance gap and enable us to design appropriate instruction for the learner characteristics at a maximum benefit, resulting in learning achievement that meets standard criteria.

Blended Learning (Curtis et al., 2005) is an integration of instructional containing educational technology and hands-on works, or a combination of teaching and learning strategies with a variety of teaching materials. In order to reach all varied learners background, should use differentiated and flexible instruction strategies: Online Lesson and Face – Face instruction.

Thus, a performance gap of website building from those students is a crucial point for us to investigate for blended learning underneath of the ADDIE Model to closure the performance gap. Those students can experiment and develop their website building skill for their portfolio website submitting their internship and career. This learning management has the following objectives: 1) To develop the Blended Learning instructional plan for Website Development Skill on Communication Design Undergraduates using the ADDIE Model through the short-time workshop training to build Portfolio Website with WordPress. 2) Student can build their own portfolio websites.

## 2. OBJECTIVE

1. To apply the ADDIE approach into Blended Learning Management, to develop web building skill for communication design students.
2. Using rubric score to compare students' e-portfolios which built by WordPress.



### 3. METHODS

The study applied the ADDIE approach into Blended Learning Management, to develop web building skill for communication design students that divided into five phases: Analysis, Design, Develop, Implement and Evaluation.

**Phase 1 Analysis** We conducted a population characteristics survey of students' at all levels, year one to year four in the Communication Design Department (Branch, 2009). Total of 82 samplings were selected base on the general questionnaires, met the Index of Item Objective Congruence: IOC (Leekitchwatana, 2016) by three experts of communication design and information technology.

With Cluster Sampling (Leekitchwatana, 2016), we found that the characteristics of the sampling group were similar. Therefore, we selected five participants from the 2<sup>nd</sup> year group who were willing to attend the pilot training workshop, and 20 participants at the actual training workshop. Then we specified necessary resources including textbooks and learning sheets, technology, facilities and personnel. Considered three teaching method plans for the training into three options below:

**Option A:** Long Distance Learning, online teaching and video conference (Online)

**Option B:** Face-to-Face Classroom Teaching in the Computer Laboratory (F2F)

**Option C:** Blended Learning Management (BL)

**Phase 2 Design** We set the objectives and the goals for learning management of the training workshop structured into a performance report and formulated a guideline for developing learning plan: content, learning medium and proper activities for the learners. Thenceforth, we designed three plans to compare concerning tools, methods, costs and effective outcome after the workshop.

**Phase 3 Develop** We selected the most appropriate teaching plan and applied to further development of content, learning medium, and activities for the learners.

**Phase 4 Implement** We conducted the preparation for instructor and the learners and then ran the workshop.

**Phase 5 Evaluation** We evaluated the result base on the pilot training workshop and the actual training workshop. Evaluation of learning management with the use of Learner Satisfaction Survey that divided to three subjects using Likert-Type scale (Likert,1932), 1) Lesson 2) Instructor 3) Learning Management (see table 1)

**Table 1.** Average score rate and result of knowledge and satisfaction survey using Likert-Type scale

Mean	Result
4.50 - 5.00	Highest
3.50 - 4.49	High
2.50 - 3.49	Moderate
1.50 - 2.49	Low
1.00 - 1.49	Lowest

Evaluation of teaching by the students' portfolio website. This form used One-Sample Test (Leekitchwatana, 2016) comparing the result with the Rubric assessment criteria measurement at four levels. Also met the IOC from the three experts, 1) WordPress website building skill and 2) Content design for presenting the portfolio on the website.

**Table 2.** Average score rate and result of student portfolio website assessment

Mean	Result
2.41 – 3.00	The students have a WordPress website building skill at excellence.
1.81 – 2.40	The students have a WordPress website building skill at good.
1.21 – 1.80	The students have a WordPress website building skill at moderate.
0.61 – 1.20	The students have a WordPress website building skill at low.
0 – 0.60	The students have a WordPress website building skill at lowest.

**Table 3.** Assessment criterion in knowledge and utilize of WordPress (W) and content design (C)

Criterion	Explanation	Objective
1. Theme	Learners can download and select theme in addition to the program provided. Be able to change a background other than the theme provided.	W
2. Header	Learners have own website name and logo.	W, C
3. Webpage	Use “page” to create and publish new webpages at least three pages.	W
4. Homepage	Learners can set the homepage from a newly created webpage. There contains of images and wordings.	W, C
5. Text	Use “blog” tool to insert a plain text, title, various text style.	W
6. Image	Use “blog” tool to insert image more than one with caption underneath the image.	W
7. Navigation	The Learner can add a navigation menu, to connect other webpages in the right orders.	W, C
8. Profile	Profile picture, short-bio, skills, contact information	C
9. Portfolio	At least of three pieces of works are shown.	C
10. Hyperlink	Learner can create two hyperlinks to other websites at least of two.	W

## 4. RESULTS

**Phase 1: Analysis** We surveyed target audience characteristics. Total 82 participants and Data were analyzed as below,

**Table 4.** Table of target audience characteristics (N=82)

Demographic		N	Percent	
1.	High school program / Vocational education and training graduation			
	● Sciences and Mathematics program	28	34.146	
	● Any Arts program (Languages / Mathematics)	49	59.756	
	● Other	5	6.098	
2.	Have you ever learnt or experienced in website building?			
	● Yes	47	57.317	
	● No	35	42.683	
Knowledge (rating scale)		Mean	SD	Result
3.	Basic computer skill	3.24	0.639	Moderate
4.	Content Management System	1.66	0.788	Low
Attitude (rating scale)		Mean	SD	Result
5.	Website development is difficult.	3.26	0.914	Moderate
6.	Knowing how to build a website is important.	4.28	0.790	High
7.	Portfolio website is necessity.	3.73	0.890	High
8.	Want to learn how to build a website without any computer code knowledge.	4.16	0.975	High

According to the survey of 82 target audiences at the Department of Communication Design show the students who graduated in arts program = 59.75%, science = 34.14% and others = 6.09%, have experience in learning and website building = 57.31%, Basic Computer Skill at moderate level = 3.24, but has website development skill with CMSs at Minimal level, mean = 1.66. Each attitude in relation to website development skill is difficult at minimal level, mean = 3.24. Design and website building skill is essential for work is at the most level, mean = 4.28. The necessity of having a portfolio website is at the most, mean = 3.73. If there is an instant website builder program that can assist without understanding of Computer Programming Language, is at the most level, mean = 4.16. This stage shows that the students thought, even with a lack of knowledge of computer programming language, and never use of CMSs. Website building is necessity.

**Phase 2 Design** Our objectives on this phase are 1) Designing instructional material for blended learning management. 2) Organizing a training workshop "Building a WordPress Website" for communication design at Faculty of Architecture King Mongkut's Institute of Technology Ladkrabang. 3) Enabling the students to gain more knowledge and website building for their portfolio using WordPress. Also, they can apply the knowledge and the skill into another subject.

We conducted a Task Inventory that logically organizes the content so that the students can construct the knowledge and skills necessary to achieve the instructional goals. The term inventory literally means a complete list of items. The items, within this context, refer to the performance tasks required by the student to achieve an instructional goal.

**Phase 3 Develop** We developed online lessons by WordPress that consist of content and proper explanation for those students.

1. Guidance of WordPress website building
2. FTP setting and file upload that necessary for WordPress setting
3. WordPress set up on the server
4. WordPress Login
5. Theme Choices
6. Webpage creating
7. Homepage Setting
8. Main menu and linking setting for the website

**Phase 4 Implement** The Training Workshop was processed on April 1st, 2019 at Computer Service Centre and November 19th, 2019 at Central Library's internet room. 46 students participated in our class to learn and build their own first e-portfolios.

Students were noticed in advance in order to receive information via the online lesson, must prepare the content with the media files that would be used to build a website on the training workshop day. One of the researchers was an instructor and he allowed the learners to interrupt and ask question during the session. On the actual training day, there was a problem caused by computer equipment in the initial computer laboratory. So the learners' group had to move to another lab, then again faced other pieces of equipment error occurrence, time waste. Also at the pilot training workshop, we found the performance gap caused the learners. That is the knowledge, differentiation of internal web building that made the

learner did not understand. Thus, we accounted this issue to enhance further instructional design for the actual training workshop.

**Phase 5 Evaluation** We conducted a satisfaction survey with the questionnaire of 11 questions to the learners that divided to three parts, online learning material, instructor and the training workshop. 20 students who responded our survey are very satisfied with the workshop. First of Instructor, Online Learning material is second and third is facilitation. (see table 5)

**Table 5.** Student Satisfaction Questionnaire Survey after workshop (N=20)

Online Learning Material	Mean	SD	Result
1 Suggestions given are proper to learn and understandable	4.50	0.827	Highest
2 The images on the online learning material are interesting. Consistent with the content and encouraging.	4.40	0.821	High
3 Characteristics, size and font colors are manifest and appropriate.	4.45	0.887	High
4 Use of appropriate symbols, information accessible without complex.	4.45	0.887	High
5 Connection of the chapters are responding to the need of learners.	4.55	0.826	Highest
6 The arrangement of artistic elements in the lesson are appropriate, attractive and clear.	4.30	0.801	High
The lessons are flexible responding to individual learners. The learner can do respectively and categories the content.	4.50	0.889	Highest
7 Language use is appropriate to the subject.	4.55	0.759	Highest
8 Content is compact, clear, and hierarchical. Understandable and connectable from existing knowledge to new knowledge.	4.50	0.827	Highest
9 Content is suitable for learners.	4.45	0.826	High
10 Teaching Preparation.	4.70	0.571	Highest
11 Information conveying.	4.75	0.550	Highest
12 Explanation-able and direct to the point.	4.80	0.410	Highest
13 Language use is appropriate to the subject.	4.70	0.657	Highest
14 Allow the learners to interrupt and ask questions and receive direct answers on the point.	4.80	0.41	Highest
Training Workshop/Facilitation	Mean	SD	Result
15 The workshop content is covered all the point and understandable.	4.50	0.607	Highest
16 The workshop duration is suitable.	4.35	0.587	High
17 The workshop atmosphere is convenient.	4.40	0.598	High
Summary	Mean	SD	Result
18 Online Learning Material	4.45	0.678	High
19 Instructor	4.75	0.449	Highest
20 Training Workshop/Facilitation	4.42	0.506	High

The results show that overall learners' satisfactions are above, moderate. The online learning material and training workshop/facilitation are high, and the instructor is the highest.

**Table 6** Overall assessment results of the learners' portfolio website. (N=46)

	Mean	SD	Result
score	2.40	0.53	excellence

Base on Overall assessment results of the learners' portfolio website, 46 pieces using the Rubric assessment criteria measurement at four levels (see table 3). The average score is 2.40 at an excellence level. (see table 6)

## 5. DISCUSSION AND CONCLUSION

Blended Learning according to the ADDIE model that we applied to closure the performance gap and improve the effectiveness of website development skills, for the communication design students. The results of this study support previous finding that using ADDIE, have helped us to find out the learners' characteristic, enabled us to design instructional appropriately to the target audience. Also, use the framework is an approach to assist educators to operate learning management effectively. Moreover, the analysis stage is essential, and time needed. Although, online-learning is cost-effective as comparative to classroom, and engaging the millennial learners. This is one-way communication, the learners may feel isolated in the experience and not receive straightforward feedback from the instructor (Andrasari, 2016 and Aly, 2016). Blended Learning, F2F instruction with online content is a proper instructional for the learners' with two way communication who still need feedback from their lecturer in keeping with the research of Morton et al. (2016), and another evidence says, they do not want to see complete replacement of didactic teaching with online learning and the lecturer want to see the students. (Avila, 2016).

At the design and development stage, we carefully created an online lesson consisting of appropriate content and understandable, and the whole module is one continuous learning experience with an amount of proper content to that (Morton et al, 2016). This online-learning program was made using WordPress because its technology was applicable and could be applied to create online-learning lesson as referred in Adnini (2017). We are focusing on expected learning outcome for communication design students, by evaluating a workpiece of the portfolio website which is advanced and sophisticated and serve as a viable digital tool for created an electronic portfolio for them (Avila, 2016).

Criteria are WordPress website building skill and presentations. In the implementation process, we experimented a pilot training workshop with one sampling group. Found out that the learners required more videos and animated images put on the online lesson material at some subject area in consistent with Adini (2017) and Muruganantham (2015) said, the Audio, Video and textual information should be presented in such a way that it suits the pedagogical aspects of technology. Thus, we developed the material and teaching method on the actual training workshop. At the end of the learning process, evaluation, the outcome of the overall assessment results of the learners' portfolio website, 20 pieces scored at excellence. Their satisfaction is good. The learner's feedback is positive, and they will further apply this knowledge into their other websites.

From this study, it indicates that WordPress is easy to use, sufficient and handy tools for beginner and novice web developer (Adini, 2017. Hancock, 2017. Avila, 2016. Pantaweesak, 2015. Patel et al., 2011). Even so, the outcome met the criteria but still, most of the learners used “post a blog” tool instead of “create a page” tool which did not meet the researcher expectation. WordPress is originally web blog builder tool, so that if the course is focusing the other tool, add-on or plug-in rather than web blog tool, facilitators must clearly explain those differences (Avila, 2016. Patel et al., 2011).

Therefore, we encourage to use the ADDIE approach as a guideline to design Blended Learning instructional, create an online learning lesson using WordPress because of its cost- effectiveness and insert-able a variety of media. WordPress is easy even an art student can learn to do so. We recommend that further research from education in the concept of Blended Learning with this target audience, millennial learners that educators need to carry out more research to support this subject.

## REFERENCES

- [1] Adini, M & Santana Purba, H & Ati Sukmawati, R. (2017). **Development of Blended Learning Model using wordpress**. Vidya Karya. 32. 10.20527/jvk.v32i1.4156.
- [2] Aly, I. (2016). **Comparison of students’ performance in a managerial accounting course taught in blended learning, traditional classroom, and online setting**. Quarterly Review of Business Disciplines 2(4)
- [3] Andrasari, Y. (2016). **Social Media and Social Change: self identity construction and self presentation in cybersociety**. Researchgate.
- [4] Avila, J. (2016). **Evaluation of the free, open source software WordPress as electronic portfolio system in undergraduate medical education**. BMC Medical Education 16:157.
- [5] Branch, RM. (2009). **Instructional Design: The ADDIE Approach**. Springer 140, 1–55.
- [6] Curtis J. Bonk, Charles R. Graham , Jay Cross , Michael G. Moore. (2005) **The Handbook of Blended Learning: Global Perspectives, Local Designs**, Pfeiffer & Company.
- [7] Ghani M (2018) **Adaptation of ADDIE Instructional Model in Developing Educational Website for Language Learning**. GJAT, 8(2).
- [8] Hancock, M. E. (2017). **The Use of WordPress in Online Focus Group Studies**. The Qualitative Report, 22(8).
- [9] Hu, Chuan; Zhao, Li; and Huang, Jiao. (2014). **Exploring Online Identity Re- Construction in Social Network Communities: A Qualitative Study**. PACIS 2014 Proceedings. 36.
- [10] Morton, CE, et al. (2016). **Blended learning: how can we optimise undergraduate student engagement?** BMC Medical Education, 16(1).
- [11] Pantaweesak, R. (2015). **The Development of Web-Based Instruction Lesson on Website Development**. The Institute for the Promotion of Teaching Science and Technology by WordPress. Journal of Industrial Education, 14(2), 125-131.

- [12] Patel SK, Rathod VR, Prajapati JB (2011) **Performance Analysis of Content Management Systems- Joomla, Drupal and WordPress**. International Journal of Computer Applications, 21(4)
- [13] Leekitchwatana, P. (2016). **Research methods in education**. Bangkok: Meen Service Supply.
- [14] Muruganantham, G. (2015). **Developing of E-content package by using ADDIE model**. International Journal of Applied Research, 1(3), 52-54
- [15] Ruth, C. (2013). **Content Management Systems: Trends in Academic Libraries**. Information Technology and Libraries: Valparaiso University, Valparaiso, IN.

## Development of Online Instruction with Problem Based Learning on Introduction to Programming to Promote Analytical Thinking Ability for Undergraduate Students in Computer Education Program

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### ABSTRACT

Problem-based learning can help to promote higher order thinking skills in students and nurture their analytical thinking and problem-solving ability. Participating in a self-directed and collaborative learning process helps them to develop systematic thinking skills. The purposes of this research were to 1) develop and validate the efficiency of online instruction and problem-based learning on an introduction to programming course and, 2) to study the analytical thinking ability of students before and after learning by this method. The sample group was undergraduate students at Nakhon Ratchasima Rajabhat University studying computer programming in the second semester of the 2018 academic year. The sample group was divided into one group was for finding out the efficiency of the lesson; it comprised 31 students and another group was 30 students for a purpose of making a comparison to find out the analytical thinking ability before and after they participated in teaching and learning activities based on the problem-based approach. Findings include: 1) the efficiency of activity knowledge is equal to 80.16/80.32 and 2) the level of analytical skills after learning is higher than it was before learning.

**Keywords:** Online Instruction, Problem-Based Learning, Analytical Thinking Ability,  
Introduction to Programming



## 1. INTRODUCTION

Student-centered learning shifts the focus of instruction from the teacher to the student and can promote their higher order thinking skills. The student learns independently with support from a facilitator [1]. The facilitator must give priority to 'learning' and focus on more than just 'teaching'. To develop the skills necessary for the 21st century and so they can respond to a rapidly changing society students should learn critical thinking, problem solving, communication and collaboration skills. Analytical and problem-solving skills are important for them to be able to understand and resolve difficulties in various situations [2]. This is in accordance with constructionist theory, which states that self-building knowledge is attained by learning by doing. That is, students learn by solving problems and connecting new knowledge with existing knowledge, for further improvement [3]. This sits alongside the advancements in technology that connect people in the digital age.

In present, digital literacy refers to relevant skills that enables one to adopt and makes use of the tools, equipment, and current technology and digital native refers to people who were born in the digital age, who should be armed with knowledge, provided with training on analytical thinking, including communication and management information for digital age [4]. Therefore, in an education field, it is needed to promote skills for students to adjust themselves into a rapidly changing world, that is from a traditional education to a digital learning, where students can learn by using information technology anytime, anywhere. Digital learning can be done by knowledge transforming process, building learning environment and preparing students for readiness to learn relevant skills and to think things of digital. It is teaching and learning [5] that will allow students to have relevant skills and knowledge for lifelong learning [6].

In learning on an internet network, the online instruction is a tool for learning through web-technology. Students can study in self-directed and collaborative in learning activities. The instructor must design the lesson in accordance with the learning facilities applied to the content by using multimedia that is interesting and stimulating for learning [7]. Researchers studied and conducted a literature review and found that many subjects related to programming emphasis principles and theories of programming language in order to develop as a system program blended many knowledges to apply them together such as mathematic and logic, array, iteration, structure control etc. All of them can be develop on online instruction in association with problem-based learning. In the context of learning, it was found that one of the problems in class learning founded students are understand in principles and theories of introduction programming, but they are not enough able to synthesize and analyze in problems-based. Researchers has an opinion using online learning as an intermediary in learning blend with problem-based learning to promote student learn in self-directed and by doing so students can practice their step by step thinking skills.

From the reasons as mentioned above, researchers appreciate to important of learning for efficiency learning by using design learning with cycle of problem-based learning in 4 steps: 1) Understanding the Problem 2) Learning stage 3) Solving the Problem and 4) Reflecting [8]

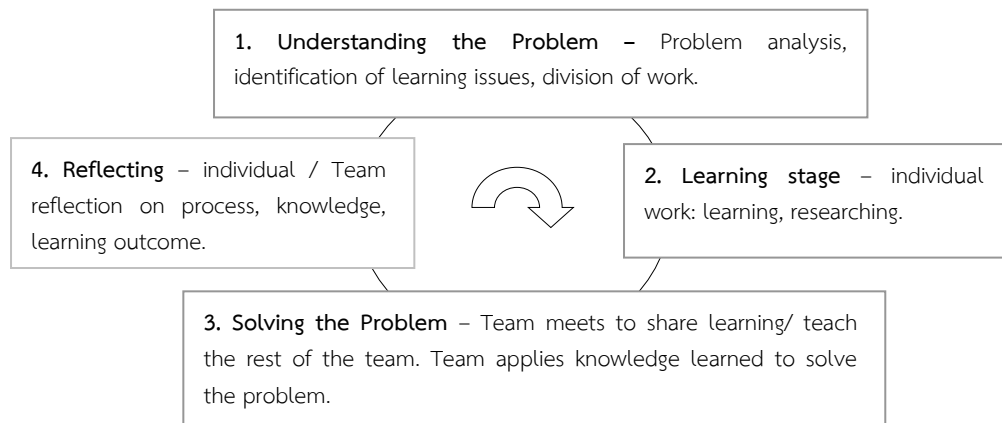


Figure 1 The PBL learning cycle

This learning model comprises main elements that covered learning followed all purposes and promoted efficiency to learn in self-directed and promote develop thinking skills and analytical thinking skills. According to Bloom [9] analytical thinking is identifying content into different parts which can explain the importance of that component and associate the relationship consists of 3 elements 1) analysis of element 2) analysis of relationship and 3) analysis of organizational. The learning management is to be direction to effective teaching and learning. The researcher is interested in studying and developing online instruction by organizing teaching and learning using problems as a base in introduction programming to promote analytical thinking for undergraduate students Nakhon Ratchasima Rajabhat University to promote problem solving skills and analytical thinking for students and they can be used for further benefits.

## 2. PURPOSE

1) To develop and validate the efficiency of online instruction with problem-based learning in introduction to programming to promote analytical thinking ability in undergraduate students of computer education program.

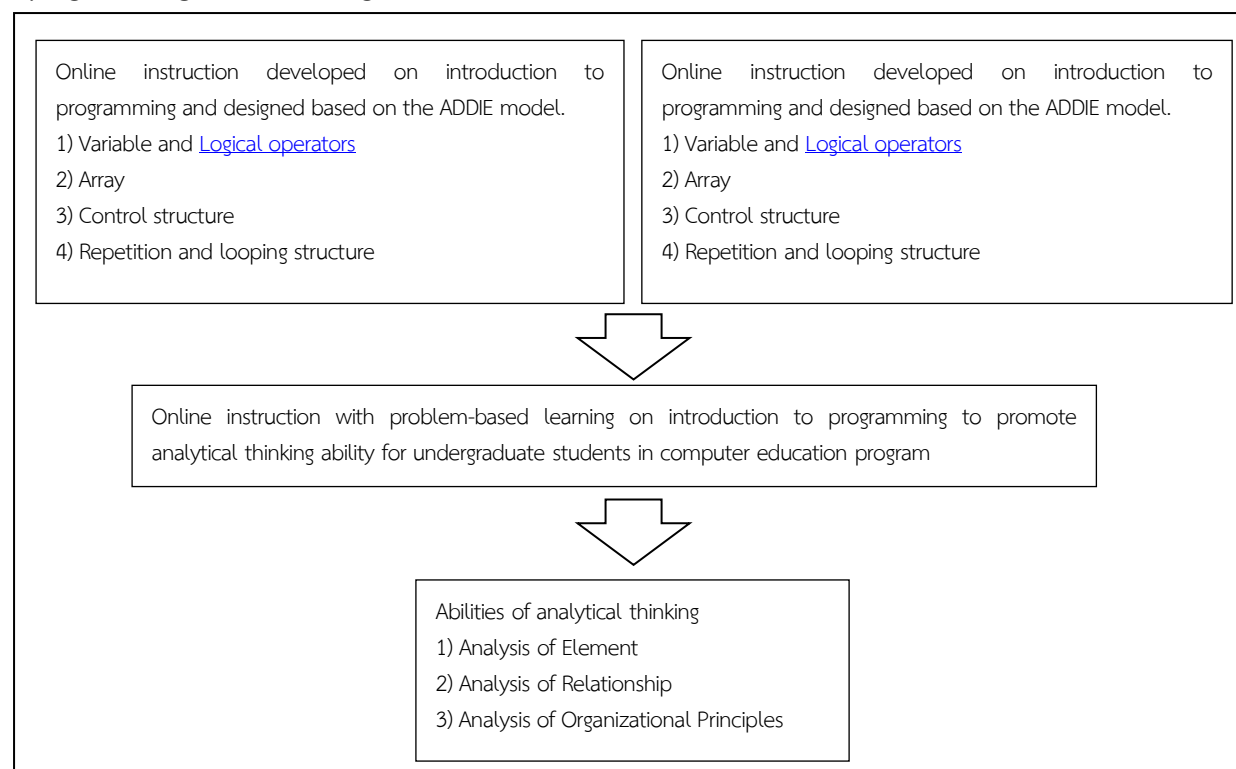
2) To compare analytical thinking ability between before and after learning using online instruction with problem-based learning in introduction to programming to promote analytical thinking ability for undergraduate students in computer education program.

## 3. RESEARCH HYPOTHESIS

1) The efficiency of online instruction with problem-based learning in introduction to programming to promote analytical thinking ability for undergraduate students in computer education is based on the efficiency criterion of E1/E2 which is higher than 80/80.

2) The analytical thinking ability after learning is higher than before learning using online instruction with problem-based learning in introduction to programming to promote analytical thinking ability for undergraduate students in computer education program is significant at the level of 0.05.

#### 4. CONCEPTUAL FRAMEWORK



#### 5. METHODOLOGY

##### 1) Population and Samples

The population was 178 undergraduate students on a computer education program during the final semester of the 2018 academic year in the faculty of education at Nakhon Ratchasima Rajabhat university. The sample group was divided into one group for a purpose to study online instruction of problem-based learning for find out the efficiency of online instruction sample group by using purposive sampling method to study online instruction of problem-based learning group of 30 students and another sample group comprised 31 students by using simple random sampling method for a purpose of making a comparison to find out the analytical thinking ability before and after they participated in teaching and learning activities based on the problem-based approach.

##### 2) Research instrumentations

1. The lesson plans on introduction to programming using problem-based learning.
2. Instruction online in Learning Management System Moodle
3. The analytical thinking ability test on introduction to programming using problem-based learning.

##### 3) Research procedure

###### Phrase I. Development of a Research Instrument

1. The online instruction in introduction programming is developed by following the problem-based learning cycle [8] and designed based on five steps of the ADDIE Model: Instructional Design Model [10] as follows:

1.1 Analysis: Study of relevant principles and theories and a literature review. Followed by data collection and analysis of the online instruction in introduction programming and an analysis of problem-based learning. The study begins by specifying the target group and choosing the teaching topics. The content that must be learned via online instruction using an appropriate learning model and activities is considered and developed following the four steps in the problem-based learning cycle as follows: 1) Understanding the problem: this begins with a definition of the problems in the four lesson plans. The instructor describes the causes of the problems and provides guidelines for solving them. Next, the students are divided into groups of six. The students participate in various situations and share in self-directing the work in their own groups. The instructor is on hand to provide support by responding to students' questions about the problems. 2) Learning stage: students research and study the assigned problems and carry out further programming coding by specifying the duration and practice of a problem. For one week they research their own issues and collect data for group working. 3) Solving the problem: the data obtained from the study is analyzed within the group and the problem is solved by programming. While the students are studying, the instructor has to provide guidelines and monitor the learning. The final step is 4) Reflecting: in the following week, the students present the methods they used to solve the problems together and their findings.

1.2 Design: Adoption of the analysis of the results to design the learning and activities according to the learning objectives, the lesson structure and content, the lesson plans, and the learning activities and assessment. Next, present the working processes for each part of the content and sort, priorities and arrange the content so it is consistent with the learning activities.

1.3 Development: Adoption of the design and development of instruction online in Learning Management System Moodle with problem-based learning for four lessons, consisting of 1) Variable and logical operators, 2) Array, 3) Control structure and 4) Repetition and looping structure. Next, design the media layouts to make the learning clear, appropriate, and attractive, including the interface, background, font size and style, graphics etc. while considering the design principles of an online lesson.

1.4 Implementation: Test the online learning instruction on a sample group of 31 students to find out whether it is efficient. The students use the learning tool for four lessons over four weeks after which they are tested. Next, collect the results from the experiment and carry out formative and summative assessments. Finally, based on the findings, improve the online instruction.

1.5 Evaluation: The online instruction is evaluated by three experts to verify its quality and provide comments. It is the improved according to the suggestions and tested for efficiency on the sample group of students. Next, it is adopted as a problem-based learning tool and used on a sample group of students whose knowledge is tested before and after using it.

2. Evaluate online instruction form in introduction programming to be rating scale 5 levels divide into content and produce media: Brought evaluate quality online instruction form in introduction programming to three experts for examine to improve. After that, the quality of the online instruction was evaluating by experts to find out the average and the standard deviation. Result of evaluation of content and production media is average is higher than 3.50. These will be considered the high-quality instruction found quality of online instruction of content in the average was 4.58 and the standard deviation was 0.62. These are in high level and quality of online instruction of produce media in the average was 4.67 and the standard deviation was 0.58. These are high level.

3. To test analytical thinking ability, the students answer 20 high-level multiple-choice questions with four optional answers. To find the index of item objective congruence (IOC), the validity is evaluated by experts. If the IOC value is higher than 0.05 it is considered a high-quality test. The validity test for analytical thinking skill was evaluated to find its IOC, and it was found that the value is higher than 0.67. Therefore, it reflects that the entire test has validity. Afterwards, 30 students, who are not in the sample group, and used to study in the subject of Introduction to Programming, took the test. The results from such testing were analyzed using statistics programs, and it shows that the difficulty/easiness index is between 0.50-0.60, which is in a fair level, for 20 items, and the discriminant ( $r$ ) is in 0.27-0.47, which is in a good level, for 20 items, and the reliability is equal to 0.71.

#### Phrase II. Learning with a Sample Group

The 30 students in the sample group learned by using online instruction. The duration of the teaching and learning was 16 hours. The learning began with 1) explaining the learning objectives, then 2) the pre-testing of 20 items, followed by 3) conducting the instructional activities through online instruction for all of four lessons over four weeks and 4) a post-test of 20 items. The test results were statistically analyzed to find the average, the standard deviations and t-test dependency.

## 6. RESULTS

1) After formative and summative assessments, the efficiency of online instruction on the 31 students was found to be 80.16/80.32 which is in accordance with the efficiency criterion.

**Table1.** the results of the evaluation of the efficiency of the online instruction with problem-based learning in introduction programming to promote ability of analytical thinking.

Evaluating efficiency	Amount of sample group	Full score	Average Score ( $E_1/E_2$ )
Formative assessment	31	40	80.16
Summative assessment			80.32

2) The results show analytical thinking ability before and after learning using online instruction with problem-based learning in introduction to programming course. It was found that analytical thinking ability was higher after learning than before it, with a significant value of difference of 0.05

**Table 2.** The Results of Analytical Thinking Ability Tests Before and After using online instruction with problem-based learning in introduction programming to promote ability of analytical thinking.

Test	$\bar{x}$	S.D.	$\bar{D}$	S.D. $\bar{D}$	T	Sig.
Pre-test	9.57	3.58	5.07	2.73	10.17*	0.0000
Post-test	14.63	2.62				

\*P < 0.05

## 7. DISCUSSION

1) After evaluating the efficiency of online instruction, the findings were 80.16/80.32 which is higher than the criterion of 80/80. The online instruction design consists of five steps based on the ADDIE model. These are as follows: 1) Analyze 2) Design 3) Develop 4) Implement and 5) Evaluate. The design was evaluated by six experts. The efficiency of the online instruction indicates that it can be used in teaching. This is consistent with the findings of Burisri [11] who conducted research on the development of web-based instruction, e-commerce systems and higher diplomas at the Department of Business and Computers, Narathiwat Technical College, and found that the web-based instruction in the e-commerce system had an efficiency criterion of

82.27/82.33, causing this researcher's study and analysis of the content to be further developed, objectives to be defined, the web-based instruction to be evaluated by experts and improved until it was ready for teaching students.

2). After comparing analytical thinking ability of the students before and after learning, the results show that the ability to think analytically was significantly higher afterwards than before learning, at a level of 0.05. The pre-test result was 9.57 and the post-test was 14.63, which relates to the hypothesis. This is consistent with the findings of Yappharas [12] who conducted research into the development of web-based instruction using problem-based learning to promote analytical thinking in Matthayom two (Grade eight). He found that analytical thinking ability was 7.73 pre-test and 17.80 post-test. Therefore, the students' ability to analyse a situation after the use of web-based instruction is higher than before its use, with a statistical significance of 0.05., causing problem-based learning is based on the problem determination process. This involves dealing with a problem seen in everyday life in order to motivate students. This incorporates such approaches as organizing group brainstorming sessions to encourage students to analyze problems, conducting self-study, exchanging learning, discussing the results of the study, and evaluating the work they are doing.

## 8. CONCLUSION

The research results indicate that online instruction associated with problem-based learning can help to promote analytical thinking ability in terms of introduction to programming through the development of systematic thinking. Students can synthesize and analyses programming in terms of a problem-based and problem-solving situation by using a strategy involving self-directed and collaborative learning. Throughout the process, the instructors are guided from the beginning to the end of the learning activity. A pilot study with online lessons was used as a teaching tool, and the indications were that the quality was good, and that the approach was suitable for the students. The researcher designed the online instruction based on the principles of the ADDIE model and the outcome was evaluated by experts and was subsequently improved. It has since been used in an actual teaching situation.

## REFERENCES

- [1] Melissa N. L. Y. A., Shuki O., Mohd Ali S., Muhamad Saiful Bahri Y. and Hairul Nizam I. (2012). Training Module Series: Student-Centered Learning (SCL) Approaches for Innovative Teaching. Module 2: Philosophy of Student-Centered Learning (SCL). CDAE, USM.
- [2] Partnership for 21st Century Skills (2009). A Framework for Twenty-First Century Learning. Retrieved April 16, 2019, from <http://www.battelleforkids.org/learning-hub/learning-hub-item/framework-for-21st-century-learning-definitions>.
- [3] Papert, S. (1999). Eight big ideas behind the Constructionist Learning Lab. Invent to learn. Retrieved April 16, 2019, <http://stager.org/articles/8bigideas.pdf>
- [4] NSTADA. (2015). Digital Literacy. NSTADA. Retrieved April 1, 2019, <http://www.nstada.or.th/th/nstada-knowledge/142-knowledges/2632>
- [5] Na-songkhla, J. (2018). Digital Learning Design. Bangkok: Faculty of education Chulalongkorn University.
- [6] OECD. (2012). preparing teachers and developing school leaders for the 21st century – lessons from around the world. OECD Publishing.

- [7] Rome. (2011). E-learning methodologies A guide for designing and developing e-learning courses.FAO. Retrieved April 1, 2019, <http://www.fao.org/3/i2516e/i2516e.pdf>
- [8] Beaumont C and Frank B. (2003) Problem-based learning in Computing. A higher education academy. Retrieved April 1, 2019, [https://www.heacademy.ac.uk/system/files/chris\\_beaumont\\_final.pdf](https://www.heacademy.ac.uk/system/files/chris_beaumont_final.pdf).
- [9] Bloom, B.S. (1956). Taxonomy of Educational Objectives, The Classification of Educational Goals – Handbook I: Cognitive Domain. New York: McKay
- [10] Branch, Robert Maribe. (2009). Instructional Design: ADDIE Approach. New York: Springer
- [11] Burisri, A. (2014). The Development of Web Based Instruction, e-Commerce system Development, Higher Diploma Level Department of Business Computer, Narathiwat Technical College. Journal of Princess of Naradhiwas University,6(3), September-December.
- [12] Yappharas, W. (2017). Development of Web-Based Instrucion Using Problems-based learning to Promote Anlytical Thinking in Matthayom 2 Student In Daily Internet Usage. Proceeding of National Graduate Research Conference GRC2017,70.

## Innovative Organization of School under the Office of the Basic Education (OBEC): A Second Order Confirmatory Factor Analysis

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### ABSTRACT

This study aimed to develop and examine the Goodness-of-Fit Index of Confirmatory Factor Analysis (CFA) of innovative organization of school under the Office of the Basic Education Commission (OBEC). The result is based on the empirical data. The participants for this study were 84 school directors, 332 deputy school directors, and 84 heads of ICT department under the Office of the Basic Education Commission. The tool for data collection was approved questionnaire with high content validity at 0.97. The data analyzed by Confirmatory Factor Analysis (CFA). The study shows the innovative organization of school under the Office of the Basic Education Commission consists of six factors: Strategic Management, Organizational Culture, Human Resource Development, Innovative Leader, Information and Communications Technology, and Learning Organization. The results of examination of the Goodness-of-Fit Index of Confirmatory Factor Analysis (CFA) found the model fit indexes based on the empirical data. The factor loadings of six factors were from 0.77 – 0.95 and factor loadings of indicators were from 0.59 – 0.78.

**Keywords:** Innovative Organization, Strategic Management, Organizational Culture, Human Resource Development, Innovative Leader.

### 1. INTRODUCTION

Innovation is an important source of growth and a key determinant of competitive advantage for many organizations. Achieving innovation involves the coordinated efforts of many different actors and the integration of activities across specialist functions, knowledge domains and contexts of application. Thus, organizational creation is essential to the process of innovation [1]. The ability of an organization to innovate is a pre-condition for the successful utilization of inventive resources and new technologies. In the same way, the starter of new technology often presents complex opportunities and challenges for organizations, leading to changes in managerial practices and the emergence of new organizational forms. Organizational and technological innovations are intertwined [2]. The organization must always be ready to change and adapt. "Innovation" is a necessity in organizational management to solve original or new problems that arise. It is something that organizations in this era need to invent and practice, including process innovation and management innovation. The innovative organization is a new type of organization that has improved and changed the way of thinking to create new things that are different and useful [3] and it has been the subject



of much interest in society as it is suitable for the environment outside the organization that is both complex and dynamic. Innovation is a purposeful organized and risk-taking change introduced into any work organization [4]. Supporting the innovation of personnel within the organization will create the ability to compete in addition to long-term growth [5].

However, the innovative organization is the new choice for organizational development, especially in the education industry, which seeks to use innovation to drive management so that educational organizations can develop the whole system. The success of the educational organization and survival in such a fast-changing world depends on being creative, discovering new things and innovation [6] [7]. Education institutions should develop administrative systems, instill personnel with behaviors or actions that are consistent with the vision and goals [8] and describes innovation as a process in which new programmed or practices are put in place or injected into the operation of a system to replace old or ineffective ones.

Education organizations must learn to take advantage of innovations arising from technological developments rather than just teaching online. They must develop the people to have the potential for innovation, increase the ability to use ICT by integrating teaching, research and institution management as well as developing knowledge management and innovation management [9] by setting up a framework for strategic innovation management, scheduling management according to local characteristics in accordance with the local context, culture, economic and social structure and should implement innovation to cover all dimensions [10]. Institution administrators need to bring innovation and strategies for use in management to meet the needs of parents and students, so innovation is a tool for developing educational processes [11]. Loaiza & Abarca [12], who conducted a research study on the determination of the innovation capability of the University of Ecuador, found that after applying MIES (The Innovation Model of Higher Education), the model was able to explain the driving force in manufacturing innovation through MIES factors resulting in the ability to achieve innovation and create information that was useful for instructors at the university, especially for corporate executives. In addition, it was found that it helped to make significant changes for educational development. Executives had innovation as a management model, instructors could innovate in new ways for teaching and learning, and students had innovative skills. An innovative organization in education is considered a strategy for effective education development based on the process of driving the educational institutions to be a quality organization by defining educational management model that is suitable for the modern era, relying on the technology system as a base to develop innovation should be distributed to all parts of educational management services ranging from registration systems, courses, teaching management, teacher development as well as the development of administrative and educational management formats [13].

Though, the problem of productivity and efficiency in education is even more striking when education is compared with other public policy sectors, which have realized enormous productivity gains in the past decades. In sectors such as health, technology has been a major driver for increased productivity and efficiency with much improved outcomes even if the cost has also gone up. Many observers wonder why enormous advances in technology have not yet led to similar improvements in education governments have made substantial investments in bringing technology, mainly information and communications technology (ICT), to schools. However, following on from the analysis of PISA data, it has not yet been possible to innovate education and educate for innovation [14].

Therefore, the researcher is interested in studying the innovative organization of school under the Office of the Basic Education Commission in Thailand in order to apply the results of the study to create and develop the basic education institution administration model for development into an innovative organization, of which the institution administrators can apply the results of the study to in real use. Educational agencies, both in government and private sectors, can apply the results of the study to develop an organization development strategy for innovation in a basic education institution. Additionally, able to use the factors and indicators from the research as a tool for measuring and evaluating the school's innovative organization.

## 2. OBJECTIVE

This research aims to examine the Goodness-of-Fit Index of Confirmatory Factor Analysis (CFA) of innovative organization of school under the Office of the Basic Education Commission (OBEC).

## 3. METHODS AND MATERIALS

### 3.1 Research Design

This study used an exploratory descriptive research design centered primarily on a quantitative approach, which deployed a survey questionnaire technique, a convenience sampling method, and descriptive and inferential statistics. The research studied innovative organization of school from the concept of Christiansen [15], Tidd et al [16], Von Stamm [17], Wichitchanya, Durongwatana & Vadhanasindhu [18], Seyed [19], Akin [10], Van Lancker et al [20], Akpan [4], Guimaraes & Paranjape [21], Fernandes Rodrigues Alves et al [22], Sultana, Nigar and Mohammad Anisur Rahman [23]. It was found that an innovative organization of OBEC consists of six factors: Strategic Management, Organizational Culture, Human Resource Development, Innovative Leader, Information and Communications Technology, and Learning Organization.

### 3.2 Variables

The variables used to study an innovative organization of school under the OBEC, consist of:

- 1) Strategic Management
- 2) Organizational Culture
- 3) Human Resource Development
- 4) Innovative Leader
- 5) Information and Communications Technology
- 6) Learning Organization

### 3.3 Instrument

The instrument used in the research is questionnaire with five rating scales, divided into two sections. The first section is about general information of the respondents, and the second section is about qualification of an innovative organization of OBEC consist of six factors: 1) Strategic Management 2) Organizational Culture 3) Human Resource Development 4) Innovative Leader 5) Information and Communications Technology and 6) Learning Organization.

Research instrument was carefully assessed by the experts based on its validity and reliability, and it achieved a 0.97 Cronbach's alpha ( $\alpha$ ) coefficient value (considered "good" in most social sciences and humanities research studies) [24].

### 3.4 Populations and Sample group

Populations are 353 school directors, 1,012 deputy school directors and 353 heads of ICT department under the Office of the Basic Education Commission (OBEC)

Sample groups are 84 school directors, 332 deputy school directors, and 84 heads of ICT department under the Office of the Basic Education Commission. The sample groups are from stratified random sampling. The sample represented various ethnic and academic backgrounds.

### 3.5 Data Collection

The questionnaires were sent through post to the respondents. Then, the questionnaires were examined by added numbering on the questionnaires paper, which were specified. The questionnaires were examined whether they were completely answered and how many questionnaires were returned.

The returned completed questionnaires are 100.00 % of all sent questionnaires.

### 3.6 Methods of Analysis

The research analyzed mean, standard division and second order confirmatory factor analysis, in order to examine the item objective congruence and Goodness-of-Fit Index.

## 4. FINDINGS

The results of the data analysis show the following:

Innovative organization of school under the Office of the Basic Education Commission consists of six main factors: Strategic Management, with four indicators, Organizational Culture with four indicators, Human Resource Development with four indicators, Innovative Leader with four indicators, Information and Communications Technology with four indicators, and Learning Organization with four indicators. The results of examination of the Goodness-of-Fit Index of Confirmatory Factor Analysis (CFA) found the model fit indexes based on the empirical data were =108.12; df=248; P-value=0.10007; Relative =1.00; RMSEA=0.033; NFI=1.00; RMR=0.001; SRMR=0.014; GFI=0.99; AGFI=0.97; NIF=1.00; IFI=1.00; CFI=1.00; CN=754.61. The detail of data analysis result can be showed as Table 1.

**TABLE 1.** Result of second confirmatory factor model analysis innovative organization of school under the Office of the Basic Education Commission (OBEC).

Innovative organization of under the OBEC	$\bar{X}$	S.D.	Factor Loading	Standardize Error	t	R <sup>2</sup>
<b>Strategic Management</b>	<b>4.63</b>	<b>0.50</b>	<b>0.77</b>	<b>0.04</b>	<b>18.08</b>	<b>0.58</b>
The analysis on environs that facilitate the creation of innovations of the school (X1)	4.64	0.57	0.78	-	-	0.65
The making of visions, missions, goals and orientations for thinking, inventing and using innovations for working (X2)	4.61	0.60	0.68	0.02	13.43	0.59
The consistent review of management strategies for adjusting and updating the strategies in accordance with the advancement of technologies (X3)	4.58	0.66	0.77	0.02	15.31	0.47
The assessment of management strategies in order to apply the outcomes to the analysis on the profile of the success of the school management (X4)	4.63	0.40	0.74	0.02	12.26	0.67
<b>Organizational Culture</b>	<b>4.40</b>	<b>0.40</b>	<b>0.86</b>	<b>0.04</b>	<b>19.25</b>	<b>0.72</b>

TABLE 1. Continued from previous page

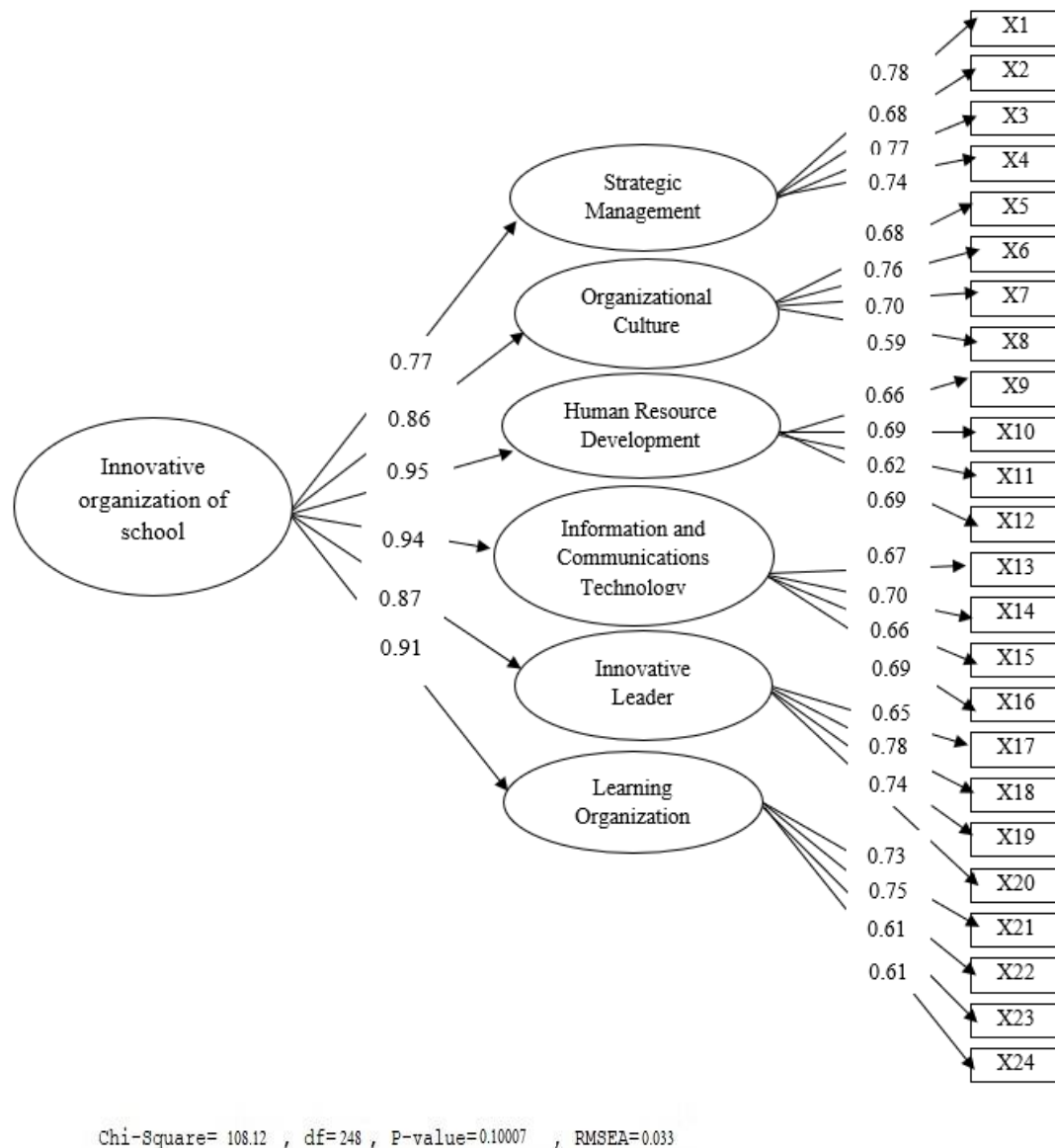
Innovative organization of under the OBEC	$\bar{X}$	S.D.	Factor Loading	Standardize Error	t	R <sup>2</sup>
The establishment of cross-profession team to invent innovations continuously (X5)	4.51	0.68	0.68	-	-	0.46
To give to teachers and personnel the chances to express their opinions (X6)	4.49	0.67	0.76	0.02	11.53	0.69
To promote creativity (X7)	4.22	0.72	0.70	0.02	13.53	0.58
To recognize teachers and personnel who invent innovations (X8)	4.36	0.61	0.59	0.02	14.03	0.54
<b>Human Resource Development</b>	<b>4.35</b>	<b>0.32</b>	<b>0.95</b>	<b>0.04</b>	<b>17.95</b>	<b>0.88</b>
The estimation of requirement necessary for knowing the directions for improving teachers and personnel (X9)	4.26	0.56	0.66	-	-	0.52
Teachers and personnel's participation to training courses and seminars for inventing and developing innovations (X10)	3.95	0.59	0.69	0.02	13.57	0.63
The use of multiple personnel improvement programs, such as online training systems, seminars, meetings and knowledge exchanges in Professional Learning Community (X11)	4.58	0.62	0.62	0.02	14.35	0.56
Praise and incentives for teachers succeeding in creating innovations (X12)	4.62	0.52	0.69	0.02	14.05	0.59
<b>Information and Communications Technology</b>	<b>4.58</b>	<b>0.42</b>	<b>0.94</b>	<b>0.05</b>	<b>18.81</b>	<b>0.89</b>
Teachers and personnel's abilities to access sources of knowledge, to exchange and transfer knowledge, and to apply knowledge consistently (X13)	4.58	0.63	0.67	-	-	0.56
The use of information and telecommunication systems for the administrators' decision making (MIS) (X14)	4.50	0.54	0.70	0.02	13.94	0.60
The availability of modern spaces and domains for storing data and information such as I-Cloud, Google Drive (X15)	4.73	0.49	0.66	0.02	14.51	0.55
The establishment of the Innovation and Technology Administration Center to disseminate knowledge and guidelines (X16)	4.58	0.887	0.42	0.02	13.83	0.61
<b>Innovative Leader</b>	<b>4.57</b>	<b>0.35</b>	<b>0.87</b>	<b>0.05</b>	<b>20.18</b>	<b>0.87</b>
The Leaders acting as role models in term of creativity for their personnel (X17)	4.79	0.41	0.65	-	-	0.63
The Leaders' skills of the dissemination of knowledge, opinions and visions that are related to innovations (X18)	4.71	0.54	0.78	0.02	13.21	0.64
The Leaders' capability of the development of up to date management strategies that concur with situations and changes inside and out reside the schools (X19)	4.36	0.64	0.74	0.01	14.43	0.69
The Leaders' rationality and confidence in the potentials of teachers and personnel (X20)	4.41	0.52	0.67	0.02	14.24	0.59
<b>Learning Organization</b>	<b>4.61</b>	<b>0.37</b>	<b>0.91</b>	<b>0.05</b>	<b>17.79</b>	<b>0.83</b>

TABLE 1.

Innovative organization of under the OBEC	$\bar{X}$	S.D.	Factor Loading	Standardize Error	t	R <sup>2</sup>
Innovative organization of under the OBEC	$\bar{X}$	S.D.	Factor Loading	Standardize Error	t	R2
The provision of software and hardware equipment with high speed and modernity, which can facilitate the creation of innovations (X21)	4.57	0.56	0.73	-	-	0.54
The provision of spaces for personnel to have activities together such as meeting rooms, creative corners and innovation learning centers (X22)	4.59	0.56	0.75	0.02	14.11	0.56
The establishment of the innovation development network that consists of members with a diversity of expertise (X23)	4.62	0.60	0.61	0.01	13.04	0.64
The arrangement of knowledge exchange forums for managing educational innovations, and contests of technologies, innovations and inventions (X24)	4.64	0.54	0.61	0.02	14.45	0.52

$\chi^2=108.12$ ;  $df=248$ ;  $P\text{-value}=0.10007$ ; Relative =1.00; RMSEA=0.033; NFI=1.00; RMR=0.001; SRMR=0.014; GFI=0.99; AGFI=0.97; NIF=1.00; IFI=1.00; CFI=1.00; CN=754.61.

The results of second confirmatory factor model analysis innovative organization of school under the OBEC found that the factor loadings of six factors were from 0.77 – 0.95, the reliability was at 0.58 – 0.89. Human Resource Development has highest reliability and factor loadings of indicators were from 0.62-0.69, the reliability was at 0.52-0.63. Information and Communications Technology has factor loadings of indicators were from 0.64-0.70, the reliability was at 0.55-0.84. Learning Organization has factor loadings of indicators were from 0.61-0.75, the reliability was at 0.52-0.64. Innovative Leader has factor loadings of indicators were from 0.65-0.78, the reliability was at 0.59-0.69. Organizational Culture has factor loadings of indicators were from 0.59-0.70, the reliability was at 0.46-0.69. Strategic Management has factor loadings of indicators were from 0.74-0.78, the reliability was at 0.47-0.67. The result of the analysis can be showed as Figure 1.



**Figure 1** Result of second confirmatory factor model analysis innovative organization of school under the OBEC.

## 5. CONCLUSION AND DISCUSSION

The research of confirmatory factor model analysis innovative organization of school under the Office of the Basic Education Commission consists of six factors. The results of examination of the Goodness-of-Fit Index of Confirmatory Factor Analysis (CFA) found the model fit indexes based on the empirical data were =108.12; df=248; P-value=0.10007; Relative =1.00; RMSEA=0.033; NFI=1.00; RMR=0.001; SRMR=0.014; GFI=0.99; AGFI=0.97; NIF=1.00; IFI=1.00; CFI=1.00; CN=754.61. The factor loadings of six factors were from 0.77 – 0.95 and factor loadings of indicators were from 0.58 – 0.89.

The researcher specified the indicator of the six factors from many researches. Then, there was analysis of content accuracy by experts in order to examine the reliability of the instrument, and finally found the acceptable. It was ensured before collecting information that variable in each factor can be exactly

measured. This is consistent with indicator development process of Johnstone [25], who specified that there must be searching and examining the document strictly in order to specify effective indicators. After collecting information, that information must be analyzed in order to measure accuracy or the variable, or indicators used to measure the variable. There must be consideration of factor loading in the matrix LX or LY. Factor loading must be high and have statistical significance, t-value is more than 1.96 [26]. Moreover, there must be Construct Reliability and Average Variance Extracted [27]. The reliability of latent variable should be more than 0.60 (Construct Reliability >0.60) and mean of variance of latent variable should be more than 0.50 (Average Variance Extracted>0.50) The analysis result of factor Strategic Management, Construct Reliability is at 0.97 and Average Variance Extracted is at 0.87. The analysis result of the factor Organizational Culture, Construct Reliability is at 0.97 and Average Variance Extracted is at 0.87. The analysis result of factor Human Resource Development, Construct Reliability is at 0.97 and Average Variance Extracted is at 0.88. The analysis result of factor Information and Communications Technology, Construct Reliability is at 0.96 and Average Variance Extracted is at 0.87. The analysis result of factor Innovative Leader, Construct Reliability is at 0.96 and Average Variance Extracted is at 0.87. The analysis result of factor Learning Organization, Construct Reliability is at 0.97 and Average Variance Extracted is at 0.88. It showed that all factors passed the criteria. Hence, it can reflect the Goodness-of-Fit Index of Confirmatory Factor Analysis (CFA). This research showed that the innovative organizations of school under the Office of the OBEC consist of six factors: Strategic Management, Organizational Culture, Human Resource Development, Innovative Leader, Information and Communications Technology, and Learning Organization.

In addition to the above, the important factor of innovative organization of school under the Office of the Basic Education Commission is that of human resource development. Because, human resources are considered valuable for the organization, especially in educational institutions, which are organizations that drive the knowledge management of people which consists of personnel as executives, teachers, and students. If the educational organization wants to improve its ability to advance to become an innovative organization, it needs to rely on innovation to drive personnel development by recruitment, appointment, personnel maintenance and by considering human resources as human capital which influences innovation. They need to be consulted through the participation process to encourage innovation [4]. The research results are consistent with the study of Sitthisomjin, Somprach, & Phuseeorn [11] whose findings showed human resource management was the factor with the highest effect on organizational learning and school innovation and had the second highest total effect on school performance. In addition, the school institutions should organize training programs to develop skills collaboration alongside wide-open awareness and providing experts with the ability to share experiences, accessing information communication technologies. Teachers and students the opportunities to learn and develop the required skills.

Since the National Education Policy states that schools in Thailand must change to become innovative organizations, the implications from this study could be that ministry of Education should provide guideline or framework as a strong foundation to create and develop the administration model of basic educational institutions. Moreover, the Office of the Basic Education Commission of Thailand can use the research results to formulate a strategic framework for the development of educational institutions.

Finally, when institution management focuses on innovation throughout the organization, from communication in administration, teaching management or even exam management by using the process of learning exchange in innovation to develop the school management process, this will result in an organizational culture using technology as a base to develop and encourage endless research and innovation development.

Based on the findings, the following suggestions are offered to develop the innovative organization of school under the Office of the Basic Education Commission:

School directors, deputy school directors, and heads of ICT department support staff are proficient in the use of technology in support of information communication and technology for school management.

Teachers and educational personnel should be developed to have the knowledge and ability in using technology and to develop innovation for teaching and learning management.

Further research, covering more government schools and private schools, should be conducted to confirm the findings of the current study and support its contribution towards the development of research data.

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## REFERENCES

- [1] Van de Ven, A., D. Polley, S. Garud and S. Venkataraman. (1999). *The Innovation Journey*. New York: Oxford University Press.
- [2] Alice Lam (2004). *Organizational Innovation*. London: School of Business and Management Brunel University.
- [3] Merx-Chermin, Mireille, and Wim J. Nijhof. (2005). Factors influencing knowledge creation and innovation in an organization. *Journal of European Industrial Training*, 29 (2), 135-147
- [4] Akpan, C. (2016). Innovative Practices in School Administration. *International Journal of Educational Administration Planning and Research*, 6 (8), 45-53.
- [5] Vrakking, W.J. (1990). The innovative organization. *Long Range Plan*, 23(2), 94-102.
- [6] Caldwell, D. F. & C. A. O'Reilly. (2003). The Determinants of Team-Based Innovation in Organizations: The Role of Social Influence. *Small Group Research*, 34(4), 497-517.
- [7] Adams, R., J. Bessant & R. Phelps. (2006). Innovation Management Measurement: A Review. *International Journal of Management Review*, 8(1), 21-47.
- [8] Quinn, J.B. (1991). Managing innovation: controlled chaos. *Harvard Business Review*, 63(3), 17-28.
- [9] Asian Development Bank. (2015). *Annual Report: Scaling up to meet new development Challenges*. Manila: Asian Development Bank.



- [10] Akin, U. (2016). Innovation efforts in education and school administration: Views of Turkish school administrators. *Eurasian Journal of Educational Research*, 63, 243- 260.
- [11] Sitthisomjin, J., Somprach, K., & Phuseeorn, S. (2018). The effects of innovation management on school performance of secondary schools in Thailand. *Kasetsart Journal of Social Sciences*, 39, 1-6.
- [12] Loaiza, M., & Abarca, P. A. (2017). Determination of the Innovative Capacity of Ecuadorian Universities. *Journal of New Approaches in Educational Research (NAER Journal)* ,6 (1), 57-63.
- [13] Chen, S. C., Hsiao, H. C., Chang, J. C., Shen, C. H., & Chou, C. M. (2010). School Organizational Innovative Indicators for Technical Universities and Institutes. *Contemporary Issues in Education Research*, 3(7), 43-50.
- [14] OECD. (2016). *Innovating Education and Educating for Innovation. The Power of Digital Technologies and Skills*. Paris: OECD Publishing.
- [15] Christiansen, J. A. (2000). *Building the innovative organization: Management systems that encourage innovation*. Hampshire: Macmillan Press.
- [16] Tidd, J., Bessant, J., & Pavitt, K. (2001). *Managing Innovation Integrating Technological Market and Organization Change*. Chicester: John Wiley & Sons.
- [17] Von Stamm, B. (2008). *Managing innovation, design and creativity*. John Wiley & Sons.
- [18] Wichitchanya, W., Durongwatana, S. & Vadhanasindhu, P., (2012). The Components of the Innovative Organization: Evidence from Thailand. *Review of Business & Finance Case Studies*, 3 (1), 13-21.
- [19] Seyed, H. R. (2013). Management of Organizational Innovation. *International Journal of Business and Social Science*, 4 (1), 226-232.
- [20] Van Lancker, J., Mondelaers, K., Wauters, E., Van Huylenbroeck, G. (2016). The Organizational Innovation System: A systemic framework for radical innovation at the organizational level. *Technovation*, 52, 40-50
- [21] Guimaraes, T., & Paranjape, K. (2017). The Effect of Organization Innovativeness on Company Innovation Success. *International Journal of the Academic Business World*, 11(2), 79-92.
- [22] Fernandes Rodrigues Alves, M., Vasconcelos Ribeiro Galina, S., & Dobelin, S. (2018). Literature on organizational innovation: past and future. *Innovation & Management Review*, 15(1), 2-19.
- [23] Sultana, Nigar and Rahman, Mohammad Anisur. (2012). Innovative Leadership (People) Innovative Leadership (People). *The Jahangirnagar Journal of Business Studies*, 2(1), 1-17.
- [24] Levin, S. A., Fox, J. A., & Forde, D. R. (2013). *Elementary statistics in social research*. Upper Saddle River, NJ: Pearson Education.
- [25] Johnstone JN. (1981). *Indicators of Educational System*. London: UNESCO
- [26] Diamantopoulos, A., Siguaw, J. A., & Siguaw, J. A. (2000). *Introducing LISREL: A guide for the uninitiated*. London: Sage.
- [27] Yuth Kaiwan. (2013). *Multivariate Statistical Analysis for Research*. Bangkok: Chulalongkorn University.

## From Contemporary to Post-Quantum Cryptography: System Models, Threats, and Proposed Solutions

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### ABSTRACT

In the presence of quantum computing and quantum key distribution (QKD), it is believed that the future of cryptography will take a sharp turn into a new direction. We propose one possible direction in this paper. A new abstract model is proposed. A brief review on the traditional secret-key cryptosystem and discussion on the credibility of the secure channel, as well as on theoretical and practical security, is given. After that, impacts from quantum computation are discussed, followed by presentation of interesting ideas from quantum key distribution (QKD) and wireless physical secret-key generation. Finally, possible integrated solutions are proposed, with some insight from the secure network coding technique.

**Keywords:** Quantum Computing, Cryptography, QKD

### INTRODUCTION

One objective of this paper is to propose that the basic building block of post-quantum cryptography in the near future will take the following form.

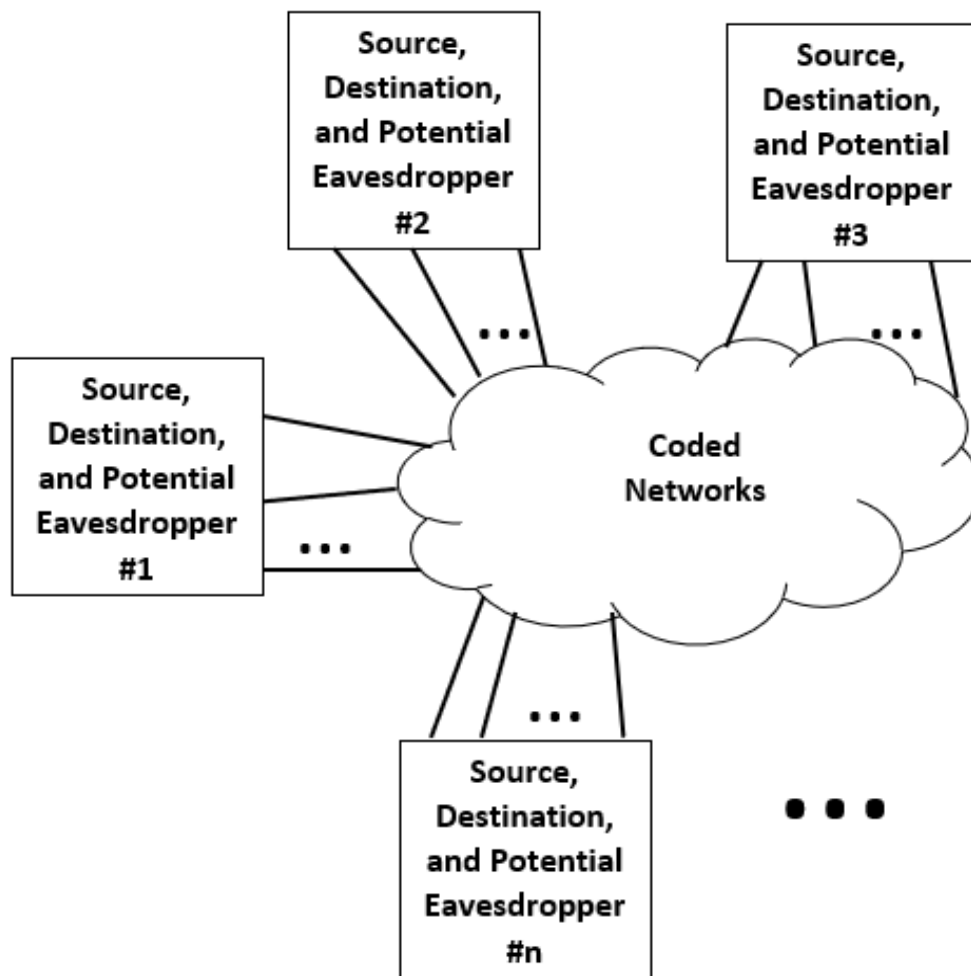


Figure 1. The Proposed Model

As the above picture is drawn conceptually as abstraction. Later, we will come to it to give examples of real-world systems. We will show that the above diagram is a generalized and convenient one to work with in post-quantum era. That is our second objective.

In order so to do, we start from discussing the traditional secret-key cryptosystem, then exclusively discuss the credibility of the secure channel, then elaborate on theoretical and practical security. After that, impacts from quantum computation are discussed and possible solutions are proposed. At the end, we will come back to Fig. 1 to conclude the article.

For the moment, let us consider the familiar block diagram in Fig. 2.

## The Traditional Secret-Key Cryptosystem

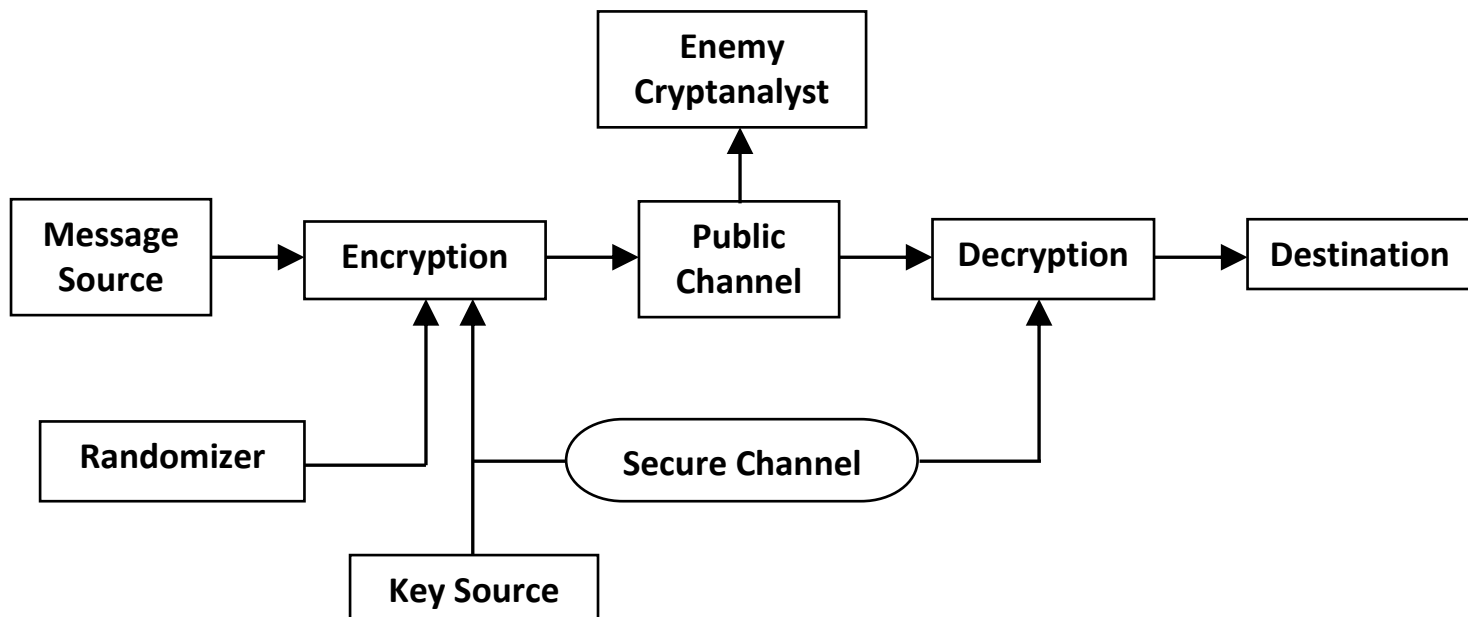


Figure 2. Traditional Secret-Key Cryptosystem [1]

In a way, the basic concept and building blocks of a secret-key cryptosystem have never changed for a long time, although the technology keeps progressing. Let us take a look at the following block diagram as I will go through every block except the message source and the destination. Also, the secure channel block is postponed to be discussed more deeply in the next section.

- (1) Encryption seems to be the most important element in the diagram. Without it, we may not be able to call it a cryptosystem. This block has gone through so long a period of evolution that nobody can tell what or when the oldest form of encryption occurred. The first well-known encryption in human history is probably the one Julius Caesar used 2000 years ago for writing letters to Cicero, known as the Caesar cipher [2]. The well-known standard encryption schemes used nowadays are familiar names such as RSA, AES, ECC. Of course, some schemes are more secure than others. Within the same encryption scheme, the one using longer key is better protected. For example, AES-256 is more secure than AES-128.

In modern communications, we normally assume that the enemy knows which encryption scheme is used. The only reason that makes the system still secure is that the enemy does not know the secret key.

- (2) Key source is also very important because secret key is needed in this model for the encryption purpose. As mentioned, longer key usually means better security. Indeed, Shannon has proved that in order to obtain perfect secrecy, one needs a key at least as long as the message itself. When the key is as long as the message, one does not need any encryption scheme more complicated than the “one-time pad.”

- (3) The randomizer is sometimes added to make our cipher appear random. One of the oldest trick of the cryptanalysts is to employ the knowledge that the letter “e” is the most frequent one in English. So they first guess the symbol representing “e” before moving to other symbols. The randomizer aims at making sure that all our symbols are uniformly distributed.
- (4) The public channel is used for the transmission of encrypted message. We assume that everybody including our enemy has an access to this channel.
- (5) Decryption is the reverse process of encryption situated at the receiver.
- (6) The enemy cryptanalyst is the bad guy trying to steal our information.

### The Secure Channel ?

With the block diagram of the traditional secret-key cryptosystem, one may get curious about the secure channel part in the diagram, which is used for the transmission of secret key. One of the questions is that if we do have such a channel, why don't we transmit our secret message through that channel directly? In that sense, all encryption schemes would be unnecessary.

In practice, we normally agree that, by secret channel, we mean another channel which is considered more secure than the public channel. Also, the secret channel should be more limited in terms of transmission capacity than the public channel or we will not need the latter. The implementation of secure channel has been the playground for imagination of cryptographers. In the past, it can be a spy in tuxedo carrying the secret key in his suitcase. For today's wireless communications, the secret key may be stored in the electronic board from the start by the manufacturer. The key should be updated later because always using the same key will be vulnerable to eavesdropper's attacks.

In modern communications, we normally assume that the enemy knows exactly how our data is encrypted. Thus, on the one hand, whether the system is secure depends on the security of the so called “secure channel” (hence the security of our key). On the other hand, the security level depends on the difficulty of breaking the cipher when the key is unknown or only partly known by the enemy.

This leads to two important question. Firstly, can we be sure that our secure channel is truly secure? Secondly, how do we determine the level of security, when we know that our key is partially or entirely safe? Although it may seem that we should start from answering the first question, we feel that starting with the latter is easier to explain. So we stop doubting the credibility of the secure channel at the moment.

### Theoretical Security versus Practical Security

Although we know for sure our key is safe. The level of security varies according to our encryption scheme and key length. In this section, we introduce two concepts used for determining the security level, the theoretical security and the practical security.

Theoretical security is sometimes named as Shannon security after its originator, Claude Shannon. It is based on the information-theoretic concept, explained informally as follows: The level of theoretical security depends on how the cipher correlates with the original message. In information theory, we use the term “mutual information” to measure the correlation amount between the cipher and the original message. If there is no mutual information between them, it means one can learn nothing about the original message by looking at the cipher alone. This condition is called perfect secrecy. If there is some mutual information, then the security level decreases with the increasing mutual information.

If our original secret message is denoted by the random process  $X$  whereas the ciphertext is denoted by  $Y$ , the mutual information between them is denoted by  $I(X;Y)$ . The perfect secrecy is attained if and only if

$$I(X;Y) = 0.$$

We can also write the perfect secrecy condition in terms of entropy as follows.

$$H(X|Y) = H(X)$$

The above equation says that perfect secrecy is achieved if the conditional entropy of  $X$  given  $Y$  is the same as the entropy of  $X$ . In other words, perfect secrecy is achieved if it does not matter to let the enemy knows about the ciphertext  $Y$ , for this does not affect his knowledge about the secret message  $X$ .

Shannon proved that, in order to achieve perfect secrecy, one needs the secret key that is as long as the secret message. In that case, we can use a very simple encryption method called one-time pad or Vernam's cipher as follows [3][4].

$$y = x \oplus z$$

$y$  is the cipher bit obtained by XORing the message with the key bit by bit. That is why we need the key as long as the message. We can see that as long as the enemy does not know the key  $z$ , he does not know the message  $x$  either.

Although Shannon's idea of theoretical security is proposed since 1949 [3], the idea is almost forgotten today as it is impractical to generate the key as long as the message and transmit it securely. Encryption today is based on the idea of practical security. For practical security, shorter key is generated and perfect secrecy is not achieved. However, the encryption scheme used is more complicated and has two important properties also suggested by Shannon. Those properties are called diffusion and confusion [3]. The former means the spreading the influence of a single plaintext bit over several ciphertext. The enemy will find it difficult to know which ciphertext bits refer to a particular plaintext bit. Ideally, if we change a single plaintext bit, half of the encrypted ciphertext should be changed. The confusion property is similar to the diffusion one but it intends to hide the relationship between the cipher and the key instead of that between the cipher and the plaintext.

Shannon's practical security becomes the basic concept in some of today's standards, such as AES and DES. Shorter key needed makes them practical. There is one difficulty, however, in transmitting the key via secure channel which may or may not truly secure.

In 1976, the era of public-key cryptography begins with Diffie and Hellman's proposed use of one-way functions [5]. The one-way function is easy to calculate but very computationally demanding to find the reverse (decrypt), when one does not have the private key. Decryption of public-key cryptography requires both public and private keys. The former is known publicly to everyone including the enemy, whereas the latter is known only by the legitimate receiver. The advantage of public-key over private-key cryptography is the ease of key management. The same public key is used in encryption for any intended receiver, who will use its own private key to decrypt the message. In this case, it is more practical in the sense that we do not need to implement the secure channel, for the key is transmitted publicly, as shown in Fig. 3. Public-key cryptography has become the concept of today's most popular (although not most secure) encryption scheme, the RSA.

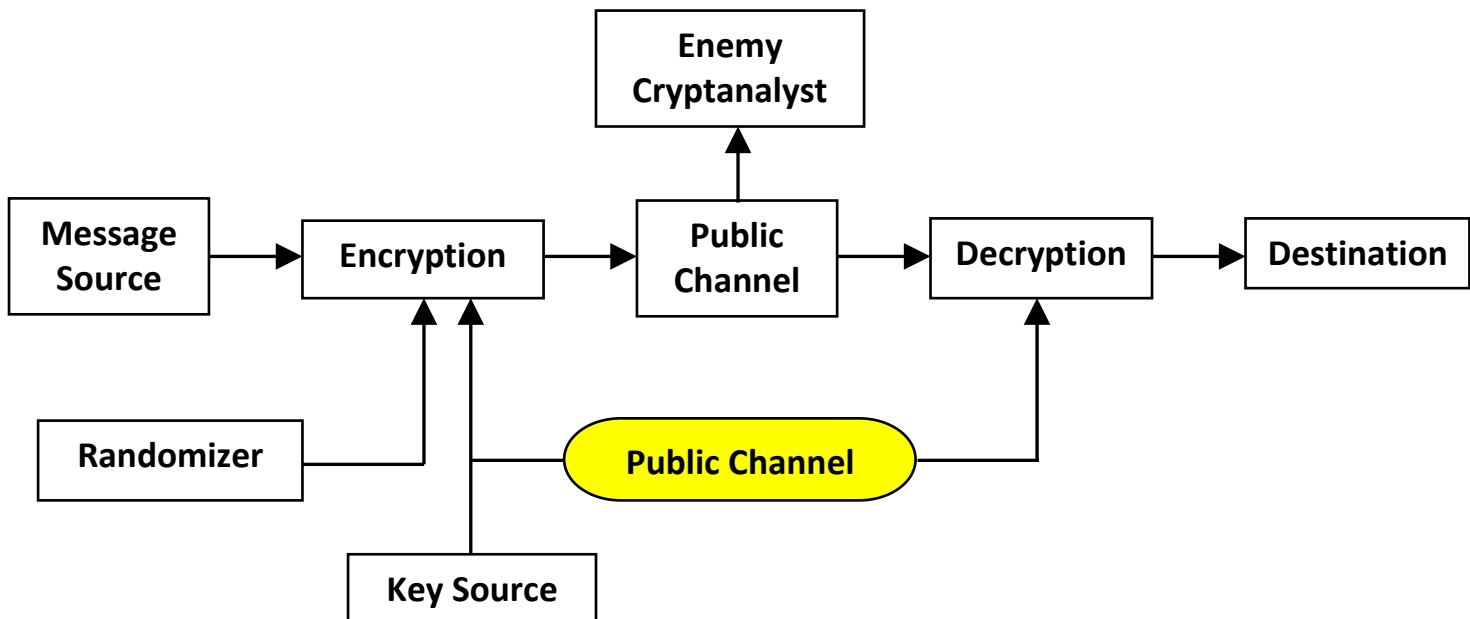


Figure 3. Public-Key Cryptosystem

We can conclude that practical security is indeed not secure. It is only extremely difficult and take too long to attack the ciphers with classical computer. We are reasonably safe, until ...

### Is Practical Security still Practical with Quantum Cryptanalyst?

What happened if we assume that our enemy possesses a quantum computer? Of course, the situation changes dramatically. With a quantum computer, the cryptanalyst is equipped with the potentially most powerful tool available to break the code.

Many of us know that quantum computers are much more powerful than classical ones. Indeed, its power increases exponentially with the number of available “qubits” as compared with linear increase with the number of bits in classical computers. Quantum computers have, however, some drawbacks waiting to be alleviated. For example, noise problems are difficult to deal with and the probability of obtaining correct computational result is not 100%.

Apart from the development of quantum computer hardware, the development of quantum software is also necessary for the success of cryptanalysis. We cannot write quantum algorithms in the way we are writing codes for classical computers. One must take into account the differences in hardware, such as the quantum logic gates, in order to program a quantum computer.

The first quantum algorithm that heavily threatened the cryptographical world was invented by Peter Shor in 1994 [7]. Whether his first intention is to challenge the cryptographers or not, we cannot imply from his seminal paper. However, his paper describes how to efficiently solve the integer factorization problem in polynomial time using quantum computers. Note that the NP-hardness of this problem in classical computation has for years guarantee the security of the RSA public-key algorithm. With quantum computers, today’s most popular encryption has become unsafe.

<b>Cryptographic Algorithm</b>	<b>Type</b>	<b>Purpose</b>	<b>Impact from large-scale quantum computer</b>
AES	Symmetric key	Encryption	Larger key sizes needed
SHA-2, SHA-3	-----	Hash functions	Larger output needed
RSA	Public key	Signatures, key establishment	No longer secure
ECDSA, ECDH (Elliptic Curve Cryptography)	Public key	Signatures, key exchange	No longer secure
DSA (Finite Field Cryptography)	Public key	Signatures, key exchange	No longer secure

**Table 1.** Impact of Quantum Computer on Cryptographic Algorithms [8]

### Is Cryptography Dead or Is This the Return of Shannon's Theoretical Security?

We can see that all public key schemes in Table 1 are now unsafe. Even the private key scheme, AES, widely regarded that today's most secure encryption, is affected. With the continual development of quantum computers, all available encryption schemes will sooner or later become unsafe.

Is this the dead of cryptography? For cryptography to survive, new ideas might be needed. There is current discussion about quantum-resistant cryptography or post-quantum cryptography which are more or less the same thing, cryptography designed to be safe in spite of the existence of quantum computation. USA's National Institute of Standards and Technology (NIST) has already set up a competition for the post-quantum standard. It recently announces candidates passing the second round of the competition, almost half of which are of the lattice-based encryption family known to be more difficult for quantum computers to attack [9].

In this article, we would like to suggest another alternative because we feel that the solution not only exist in novel encryption schemes, but also in the classic, long-forgotten concept. We are talking about the Shannon security!

### Quantum Key Distillation (QKD): Implementation of Truly Secure Channel

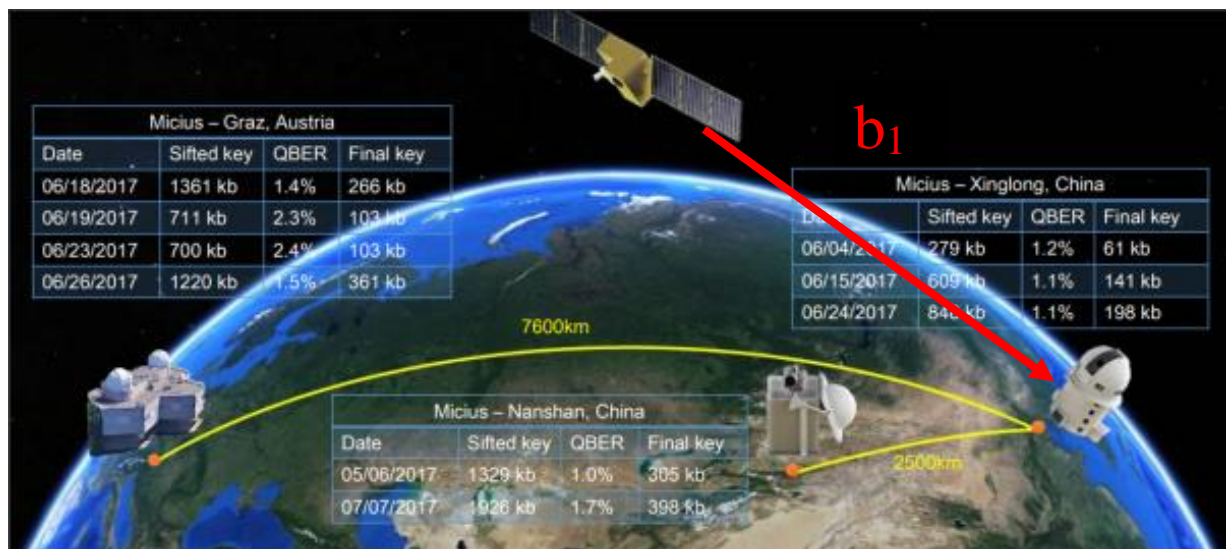
Recall two major problems that render Shannon security concept impractical. First, It requires that the key is generated at the same rate as the data. Second, truly secure channel is needed to transmit this very long key. With the idea of QKD, the second problem might no longer be a problem.

One of the most exciting quantum experiments in 2018 was performed in cooperation between China and Austria [10,11]. It successfully implemented the idea of quantum key distillation (QKD). It follows the most famous version of QKD proposed in 1984 by Bennett and Brassard (and thus called BB84) [12].



QKD is based on quantum physics uncertainty principle as well as the concept of entanglement. Two entangled photons, when not yet measured, are in the uncertain state. Once one of them is measured, both will automatically appear in the same state. Thus, by transmitting one of two entangled photons to the receiver and subsequently making measurement, we can use the measured state as the mutual secret key. Moreover, if somebody eavesdrop the photon, the legitimate transmitter-receiver pair will know this because any quantum measurement will alter quantum property. Using this idea, truly secure channel can be implemented.

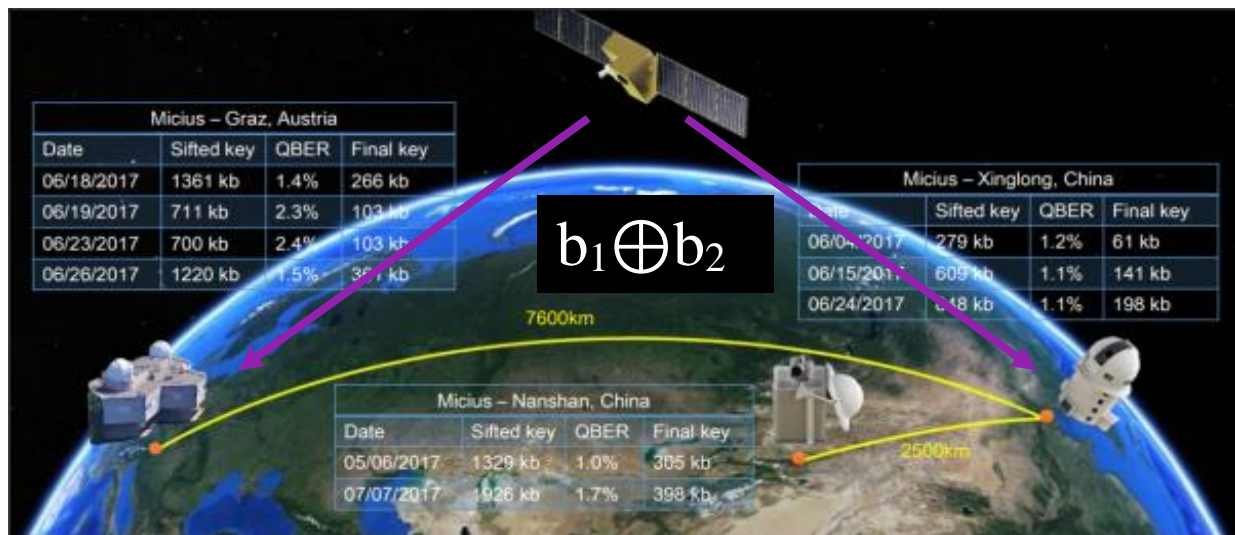
In the experiment, two pairs of entangled photons are generated at the satellite “Micius.” One photon of the first pair is transmitted to Xinglong and another is kept at the satellite. The second entangled pair is processed similarly, one being sent to Graz and another kept. After measurement, one key symbol is obtained for each pair. Let us say that  $b_1$  denotes the symbol measured at Xinglong and  $b_2$  that measured at Graz. The satellite knows both  $b_1$  and  $b_2$  and therefore transmit  $b_1 \oplus b_2$  via classical (non-quantum) satellite channel. The station at Xinglong deducts  $b_1$  from  $b_1 \oplus b_2$  to obtain  $b_2$ , whereas that at Graz deducts  $b_2$  from  $b_1 \oplus b_2$  to obtain  $b_1$ . After this process, both station knows both  $b_1$  and  $b_2$  and can concatenate them to form a mutual secret key. The key is later employed for one-time pad encryption of secret image and AES encryption for videoconference [10,11]. Note that higher data rate in videoconference makes it impractical to generate sufficiently long key for one-time pad. So AES is used instead.



(a)



(b)



(c)

Figure 4. QKD Satellite Experiment (a), (b) Transmission via Quantum Channel, and (c) via Classical Satellite Channel [10]

### Physical Layer Key Generation: Wireless and Quantum

In the previous section, we discuss transforming quantum state into secret key. We are excited not only because we can implement a truly secure channel but also because, perhaps to a greater extent, it exhibits nature's counter-intuitive phenomena of quantum entanglement and Heisenberg's uncertainty principle.

However, focusing on the implementation of a truly secure channel alone, we can see that there is another physical phenomenon, less exciting but probably more practical, that can be used to generate secret key. We are talking about generating and transmitting secure key from the ordinary wireless channels instead of quantum ones.

It is widely known that wireless channel coefficients, characterized by their phases and amplitudes, depend heavily on the location, the environment, and the movement of transmitter and receiver to the extent that other terminals except the two can predict almost nothing about their channel parameters, and hence the resultant secret key.

The generation of the secret key consists of two steps, deriving the channel estimates before quantizing them into secure key symbols. Channel estimates can be derived using a known pilot sequence, which is transmitted back and forth between transmitter and receiver such that they can learn about channel coefficients from the symbols distorted by the channel [13]. The outcome of the channel estimation process is a set of complex channel coefficients which must be quantized into secret key symbols, as shown in Fig. 5. We can see that the secure channel in Fig. 2 is implemented by the key-generating channel in Fig. 5. The key source in Fig. 2 is implemented by the combination of a channel estimator and a quantizer in Fig. 5. The randomizer in Fig. 5 is shown by dashed lines to indicate that it may be needed or not according to the encryptor used. In case we generalize our model to include both quantum and wireless key-generating channel, in the latter case incorporating the quantizer, channel estimator, and pilot-sequence source into encryption and decryption blocks. We will have a more compact model shown in Fig. 6.

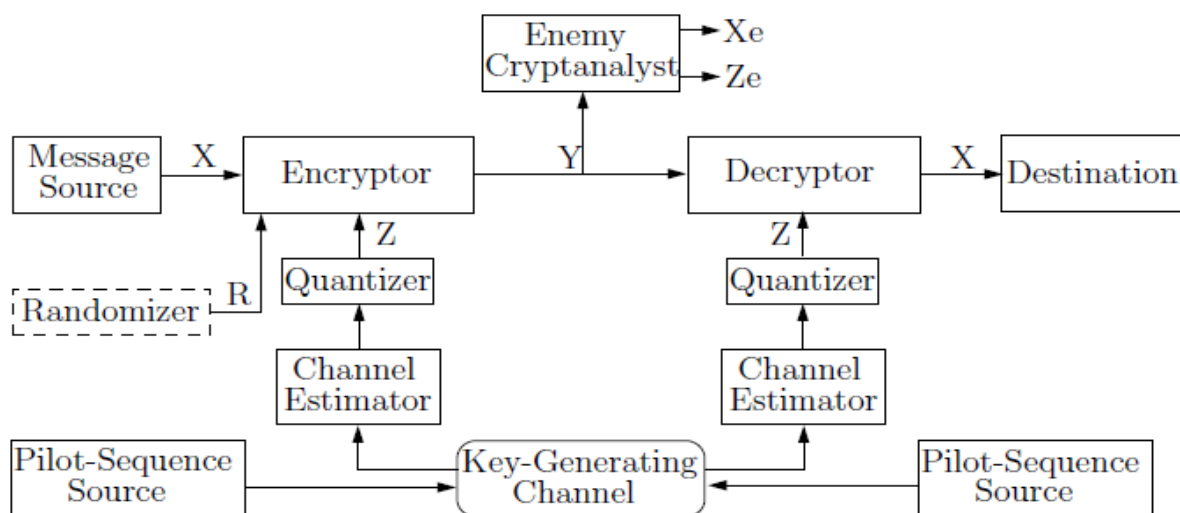


Figure 5. Secret-Key Cryptosystem with Wireless Physical-Layer Key Generation [14]

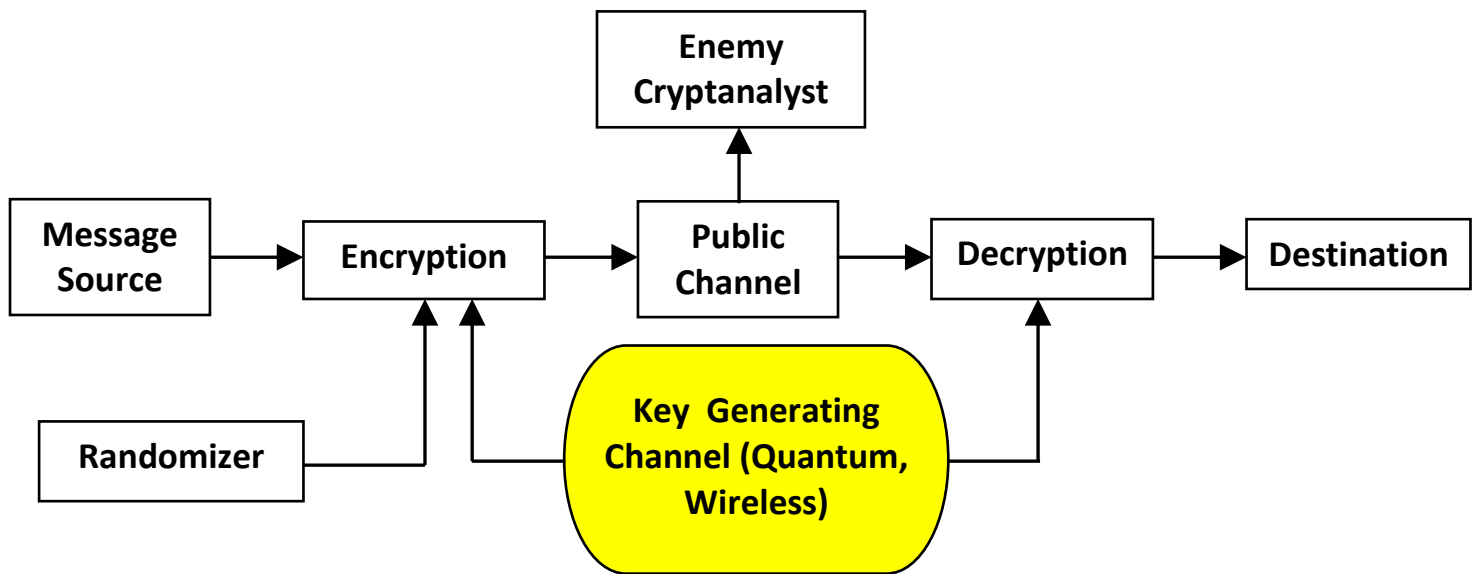


Figure 6. Generalized Model of Physical-Layer Key Generation

#### Secure Network Coding and the Variable Key Generation Rate

So far we have shown that the quantum and wireless channels allow us to generate random key and provide truly secure channel for its transmission. However, if we come back to consider the Shannon security concept. One important question remains unanswered: Is it possible for us to generate long enough key such that perfect secrecy is achieved? This penultimate section attempts to answer this question.

Recall the quantum satellite experiment. Note that  $b_1$  and  $b_2$  are simultaneously generated before being concatenated together, thus forming a longer key. If this key generation rate is not quick enough, one can add another satellite in our imagination so that we also simultaneously have  $b_3$  and  $b_4$ , thus doubling the rate. The fact that the two satellites can send photons to each other add another  $b_5$  into the equation and the rate is now 2.5 times as compared to the original setting. Indeed, if we are rich enough to keep increasing the number of satellites, we can form a network of key-generating quantum channels which increases quadratically with a linear increase in the number of satellites.

If we are not rich enough and contend with the wireless channels instead. We can just replace the satellites with the nodeMCUs in our lab and can generate secret key as long as our funding allows. If our algorithm are efficient and our equipment is good enough (perhaps with higher quality than normal nodeMCUs), we can perform one-time pad for higher data transmission rate.

Let us now consider the Shannon security derived from this quantum or wireless kind of network setting. Starting from the Chinese-Austrian satellite experiment, we can reason that if  $b_1$  and  $b_2$  are concatenated to form a longer key, perfect secrecy is not really achieved. This is because, by sending  $b_1 \oplus b_2$  via classical satellite channel, the enemy satellite can possibly intercept this information. The enemy will not know exactly what  $b_1$  and  $b_2$  are. Yet, by learning about the linear combination  $b_1 \oplus b_2$ , if the enemy happens to correctly guess either  $b_1$  or  $b_2$ , he can easily decode for another one.

Of course,  $b_1 \oplus b_2$  needs to be transmitted. In order to make the system perfectly secure, we need to sacrifice key generation rate for better security. Instead of concatenating  $b_1$  and  $b_2$  together, we can decide to use just one of them. This halves the key generation rate but now the enemy faces a much harder task of having to guess every key bit correctly. Perfect secrecy is achieved in this case.

Generalizing to the quantum/wireless key-generating network discussed previously, Other linear combination than just  $b_1 \oplus b_2$  is required to be transmitted. The choice of how key bits should be linearly combine belongs to the field of secure network coding [15,16]. Unfortunately, key rate cannot increase with the network size if strict perfect secrecy is demanded. However, if we are willing to sacrifice security level for key generation rate, we can increase the rate with the network size. At the end, it is a tradeoff depending on whether the security or the data rate is more important.

## CONCLUSION

Quantum technology is disrupting the cryptographical world and we should prepare for the consequences. We would like to end this article by fulfilling the objective given at the beginning, i.e. to propose the model re-presented again in our last figure below. By physically generating key from quantum/wireless networks, the model of cryptosystem becomes a coding network with several eavesdropper listening for the linear combining clues of  $b_1 \oplus b_2$ ,  $b_3 \oplus b_9$ , or  $b_{200} \oplus b_{201} \oplus b_{202} \oplus \dots$  depending on how our coded network is designed. If it looks as if the proposed model is only our idea which are not applicable elsewhere, we leave it for our dear reader to kindly generalizing other systems to our model for us. Certainly not a difficult assignment?

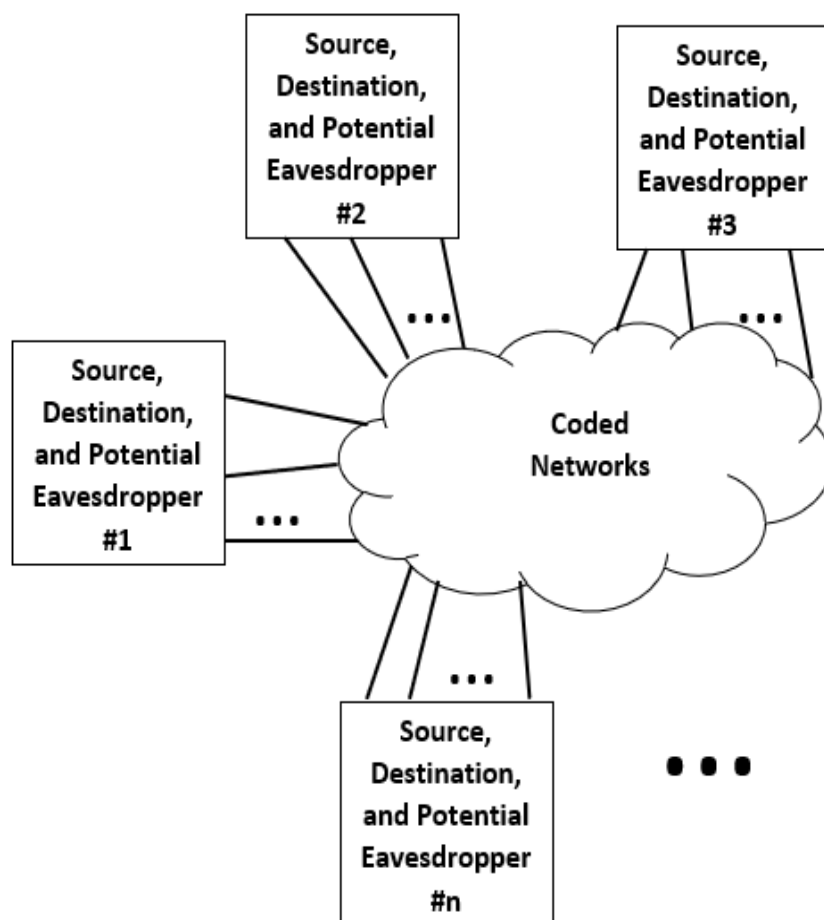


Figure 7. Final Proposed Model

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## REFERENCES

- [1] J.L. Massey, "An introduction to contemporary cryptology", Proceedings of the IEEE, 76, pp. 533–549, 1988.
- [2] D. Kahn, *The Codebreakers, The Story of Secret Writing*. New York, NY: MacMillan, 1967.
- [3] C. E. Shannon, "Communication theory of secrecy systems," *Bell Syst. Tech. J.*, vol. 28, pp. 656-715, Oct. 1949.
- [4] C. E. Shannon, "A mathematical theory of communication," *Bell Syst. Tech. J.*, vol. 27, pp. 379-423, 623-656, July and Oct. 1948.
- [5] W. Diffie and M. E. Hellman, "New directions in cryptography," *IEEE Trans. Information Theory*, vol. IT-22, pp. 644-654, Nov. 1976
- [6] T.S. Metodi, A.I. Faruque, and F.T. Chong, "Quantum Computing for Computer Architects," Morgan and Claypool Publishers, 2006.
- [7] P.W. Shor, "Polynomial-Time Algorithms for Prime Factorization and Discrete Logarithms on a Quantum Computer," 35th Annual Symposium on Foundations of Computer Science, pp. 124–134, 1994. DOI: 10.1103/PhysRevA.52.R2493 3, 19, 23, 30, 76, 91, 131
- [8] L. Chen, S. Jordan, Y.-K. Liu, D. Moody, R. Peralta, R. Perlner, and D. Smith-Tone, "NIST: Report on Post-Quantum Cryptography," NIST, Tech. Rep., 2016.
- [9] A. Khalid, S. McCarthy, M. O'Neill, and W. Liu, "Lattice-based Cryptography for IoT in A Quantum World: Are We Ready?," In 2019 IEEE 8th International Workshop on Advances in Sensors and Interfaces (IWASI), pp. 194-199, Jun. 2019.
- [10] S.-K. Liao, W.-Q. Cai, J. Handsteiner, B. Liu, J. Yin, L. Zhang, D. Rauch, M. Fink, J.-G. Ren, W.-Y. Liu, Y. Li, Q. Shen, Y. Cao, F.-Z. Li, J.-F. Wang, Y.-M. Huang, L. Deng, T. Xi, L. Ma, T. Hu, L. Li, N.-L. Liu, F. Koidl, P. Wang, Y.-A. Chen, X.-B. Wang, M. Steindorfer, G. Kirchner, C.-Y. Lu, R. Shu, R. Ursin, T. Scheidl, C.-Z. Peng, J.-Y. Wang, A. Zeilinger, and J.-W. Pan, "Satellite-Relayed Intercontinental Quantum Network," *Phys. Rev. Lett.* 120(3), 2018.
- [11] S.-K. Liao et al., "Satellite-to-Ground Quantum Key Distribution," *Nature*, vol. 549, pp. 43–47, Aug. 2017.
- [12] C.H. Bennett, and G. Brassard, "Quantum Cryptography: Public Key Distribution and Coin Tossing," In *Int. Conf. on Computers, Systems & Signal Processing*, pp. 175–179, 1984.
- [13] J. Wallace, "Secure Physical Layer Key Generation Schemes: Performance and Information Theoretic Limits," *IEEE Int. Conf. Communications*, Dresden, Jun. 2009.
- [14] A. Limmanee, and W. Henkel, "Secure Physical-Layer Key Generation Protocol and Key Encoding in Wireless Communications," In *GLOBECOM Workshops*, pp. 94-98, Dec. 2010.
- [15] N. Cai, and R.W. Yeung, "Secure Network Coding," *Int. Symp. Information Theory*, Jun. 2002.
- [16] K. Bhattad and K.R. Narayanan, "Weakly Secure Network Coding," in *Proc. NETCOD*, Apr. 2005.

## The Development of Multimedia on E-Learning with Blended Learning in E-Commerce Lesson for Undergraduate Students

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### ABSTRACT

The purposes of this research were: 1) to develop and validate the efficiency of Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students are effectively criteria. 2) to compare the students' learning achievement of pre-test and post-test by using Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students. The samples consisted, 87 of the second year undergraduate students of Faculty of Science and Technology who have enrolled in the Computer and Technology subject, in the first semester of academic year 2018, Southeast Bangkok College, which were divided into two groups as: 1) The samples to study efficiency of Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students were 40 undergraduate students using a simple random sampling method, and 2) The samples to study of the learning achievement of Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students were 1 classroom for 30 undergraduate students using cluster random sampling method. The research instruments in this study consisted of: 1) The multimedia on e-learning with blended learning in e-commerce lesson 2) The lesson plans using blended learning 3) The learning achievement test. The data were analyzed using various statistical tests including mean, standard deviation and t-test dependent. The research results finding were as follows: 1) The efficiency criterion was at 80.48/84.40 of multimedia on e-learning with blended learning in e-commerce lesson 2) The students' learning achievement of post-test by using multimedia on e-learning with blended learning in e-commerce lesson, was statistical significance at the .05 level

**Keywords:** Multimedia, E-Learning, Blended Learning, E-commerce



## 1. INTRODUCTION

The information and communication technology can be select or develop supporting education management in many ways. The selected of computer for learning resource and instruction, internet service, especially to develop of the World Wide Web (WWW) network and develop supporting media. The instruction will through by using e-learning and using internet technology as a medium of communication between the learner and the teacher. The learners construction of knowledge and skills can learn anytime anywhere to opportunity construction of learning. The learners can exchange knowledge and provided of information. Incur social learning through e-learning. By present teaching and learning has developed a variety of learning styles for learners to develop themselves according to the twenty-first century skills (21<sup>st</sup> century skills) that aims to develop learners on three skills including: 1) learning and innovation skills, 2) information, media and technology skills, and 3) life and career skills (Partnership for 21<sup>st</sup> century learning, 2015)

The instructional are integration of computer technology with conventional teaching method, In order to achieve more effective learning. This is called "Blended learning" is an approach to education that combines online educational materials and opportunities for interaction online with traditional place-based classroom methods. It requires the physical presence of both with the teacher and the student, with some elements of student control over time, place, path, or pace. (Panita Wannapiroon, 2011), practices are combined with computer-mediated activities regarding content and delivery. The blended learning is also used in professional development and training settings. It represents a much greater change in basic technique than simply adding computers to classrooms. The students are able to access teaching materials via the internet network according to the advice of teachers anywhere, anytime, enabling students to learn at all times (Bernath, 2012) for this reason, the researchers were interested to develop and validate the efficiency of Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students. To compare the students' learning achievement of pre-test and post-test by using Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students by using the pilot courses in Computer and Technology subject, which the course is instructional for students of the Faculty of Science and Technology Southeast Bangkok College. This is enrollment according to the regulations of the university. The researcher therefore studied the concept of the development of multimedia on E-learning including studying the concept of learning process management of blended learning. To be used as a guideline for the development of teaching and learning styles the twenty-first century learning and the highest achievement for students, who have enrolled in this subject, and another subjects in the future.

## 2. OBJECTIVE

2.1 To develop and validate the efficiency of Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students.

2.2 To compare the students' learning achievement of pre-test and post-test by using Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students.

## 3. LITERATURE REVIEW

### 3.1 Blended Learning



Charles R. Graham (Graham, 2012), Brigham Young university from The United States gave the following definition of blended learning as blended learning systems combine face-to-face instruction with computer-mediated instruction

The summarized the definition of blended learning is a learning method that combines face-to-face learning methods through online computer media systems to increase the learning efficiency of learners.

### 3.2 E-learning

Jai-Thip NaSongkhla (1999) gave the meaning of e-learning that means using the properties of hypermedia and computer. The World Wide Web network. Allowing learners to learn without limiting that students must be at the same place in one place. Learning can occur at the time and place that the learner is convenient and able to solve the lessons to be updated.

The summarized the definition of e-learning that are learned through the internet and can be used with learners through blended learning methods.

### 3.3 E- Commerce

Organization for Economic Cooperation and Development (OECD, 1997) Electronic commerce is a transaction of any forms. Related to commercial activities both at the corporate and personal on the basic of processing and digital data transmission, has text, audio and images.

The summarized of E-commerce definition means spending and doing the process of buying and selling produce by electronic means such as by mobile applications and the Internet. E-commerce refers to both online retail as well as electronic transactions through any forms of internet as required by user.

## 4. CONCEPTUAL FRAMEWORK

These researches, researchers' definition conceptual framework for the development of multimedia on e-learning with blended learning in e-commerce lesson for undergraduate students were as follows:

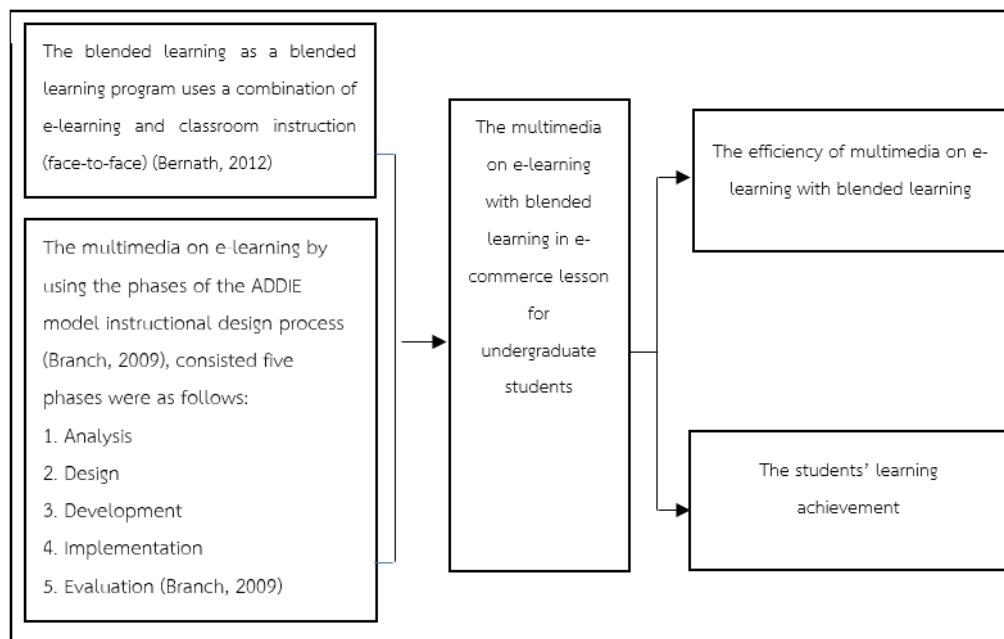


Figure 1 Conceptual Framework

## 5. RESEARCH METHODOLOGY

### 5.1 The Population and The Samples

The population in this study consisted, 87 of the second year undergraduate students of Faculty of Science and Technology who have enrolled in studying in the Computer and Technology subject. In the first semester of academic year 2018, Southeast Bangkok College.

The samples were divided into two groups as: 1) The samples to study efficiency of Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students were 40 of undergraduate students of Faculty of Science and Technology by using a simple random sampling method, which were divided into three stages of the efficiency test were as follows: Stage 1: Individual testing (1:1) using the samples, 3 undergraduate students. (1 Good, 1 Fair, and 1 Poor) Stage 2: Group testing (1:10) using the samples, 9 undergraduate students. (3 Good, 3 Fair and, 3 Poor) Stage 3: Field testing (1:100) using the samples, 28 undergraduate students. 2) The samples to study the learning achievement with Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students were 1 classroom for 30 undergraduate students by using cluster random sampling method.

### 5.3 The research process

#### Step 1. The development of the research instruments

1. The multimedia on e-learning with blended learning in e-commerce subject for undergraduate students, by using the phases of the ADDIE instructional design process (Branch, 2009) consisted five phases were as follows:

1.1 Analysis phase, the common procedures associated with the Analyze phase were analysis of learners, analyzing resources that require using both of software and hardware. The Analyze content to determine behavioral objectives using the content of the research by consisted five units were as follows: Unit 1 What is E-Commerce?, Unit 2 Things to know before opening an online store, Unit 3 Examples of finished the store, Unit 4 Credit card payment, Unit 5 Strategies to increase the number of visitors.

1.2 Design phase was used the data analyzed of Analysis phase to instructional designing were as follows: 1) The generated a flowchart to define a set of the content then connects within the lesson. 2) The storyboard for instructional design were designing by according to the learning objectives, the blended learning plan, the lesson structure and the content, and the evaluation were presented of the work procedure in each section.

1.3 Development phase were to generated the multimedia on e-learning, which is designed through validation by experts of the content and the educational technology were to develop into software that were already prepared, then the multimedia on e-learning were revised by three experts to assessed in the content were at level of good quality ( $\bar{X} = 4.17$ ), the technical quality were at level of good quality ( $\bar{X} = 4.30$ ), and were experiment with the samples.

1.4 Implementation phase were applied multimedia on e-learning to experiment according to the guidelines of (Chaiyong Promwong, 2013), to define a set of the efficiency criteria were at 80/80 by using the efficiency test with the samples were 40 of undergraduate students of Faculty of Science and Technology, which were divided into three stages of the efficiency test were as follows: Stages 1: Individual testing, using the samples, 3 undergraduate students. Stages 2: Group testing, using the samples, 9 undergraduate students. Stages 3: Field testing, using the samples, 28 undergraduate students.

1.5 Evaluation phase the researchers were made the evaluation with all of the phases of ADDIE instructional design process to develop of multimedia on E-learning by divided into two steps were as follows:

1) Formative evaluation was made evaluated that occur during each of the five phases including: Analysis phase, Design phase, Development phase, and Implementation phase. 2) Summative evaluation was made evaluated upon completion of the developed of multimedia on E-learning.

2. The lesson plans using blended learning of multimedia on E-learning with Blended learning in E-Commerce lesson, were provided with three of the lesson plans, which were divided as follows: The lesson plan: lesson 5, consisted 2 units were as: Unit 1: What is E-commerce?, and Unit 2: Things to know before opening an online store. The lesson plan: lesson 6, consisted 2 units were as: Unit 3: Examples of finished the store, and Unit 4: Credit card payment. The lesson plan: lesson 7, consisted 1 unit was as: Unit 5: Strategies to increase the number of visitors. The lesson plans using blended learning were assessed in the quality by three experts by using the Item-Objective Congruence Index (IOC) to ensure the lesson plans using blended learning that were requires research instrument to correctly measure and appropriate of the research.

3. The learning achievement test on e-commerce lesson. The learning achievement test were using the multiple choices test consisted 30 items, and has 4 answer choices option in each items, and in both of them were shuffled both of the questions items, and the answer choices for used in pre-test and post-test, also there has only one correct answer in each items. The learning achievement test were assessed in the quality by the experts, which has the content validity between the questions item and the behavioral objectives was verified by the index of item-objective congruence (IOC) consideration ranged between 0.67-1.00, the item difficulty (p) ranged between 0.20-0.80, the item discrimination (r) ranged between 0.20-1.00, and the reliability of the learning achievement test was verified by calculation of Kuder-Richardson 20 (KR-20) formula was 0.88.

### **Step 2. Experiment**

1) Inform learners of learning objectives of multimedia on E-learning with blended learning in E-Commerce lesson.

2) Guidelines relearning by explained the process of blending learning instruction by divided of learning ratio for the regular class were 40%, and for the E-learning lessons were 60% by using nine hours per week to study. The researchers were combined the role of both the teacher and the e-learning lesson altogether.

3) Stimulating recall of prior learning of the learners by allowing to do pre-test for 30 items of the learning achievement test that was created by the researchers.

4) The students allowed to learning of multimedia on e-learning with blended learning in e-commerce lesson by stimulating recall of the learners responses to allowed students to do various activities, and to do all of the exercises of learning units along with answering the students' inquiries.

5) Upon completed to learn of the five learning units of multimedia on e-learning with blended learning in e-commerce lesson, and then obtain the students allowed to do post-test of the learning achievement test

6) The researchers were conduct every step of experiment method, and also were collected of the data from pre-test and post-test of the learning achievement test, and then data were statistical analyzed. The data analysis and statistical for data analysis. 1. An analysis of the efficiency of multimedia on e-learning with blended learning in e-commerce lesson, which were using the set efficiency criteria of 80/80,  $E_1/E_2$  efficiency index. 2. The comparative analysis of the students' learning achievement of pre-test and post-test by using Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students, the statistical for data analysis were using T-test (T-test dependent sample)

## 6. RESULTS

6.1 The efficiency of Multimedia on E-learning with Blended learning in E-commerce lesson for Undergraduate students, which was found the efficiency criterion at 80.48/84.40. The summarized results of the efficiency of multimedia lessons on e-learning as shown in Table 1

**Table 1.** The results of the efficiency of Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students

The samples	Formative evaluation			Summative evaluation			Efficiency test ( $E_1/E_2$ )
	Full score	Average $\bar{X}$	Percentage ( $E_1$ )	Full score	Average $\bar{X}$	Percentage ( $E_2$ )	
28	30	24.14	80.48	30	25.32	84.40	80.48/84.40

from the table 1, the efficiency of Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students, with the samples were 28 undergraduate students was 80.48/84.40, which was higher than the specified criteria at 80/80, Finally, these the samples were used to find out of the students' learning achievement.

6.2 The students' learning achievement of post-test by using multimedia on e-learning with blended learning in e-commerce lesson was found higher than pre-test. The summarized results of the efficiency of multimedia lessons on e-learning as shown in Table 2

**Table 2** The results of the students' learning achievement were analysis comparison between pre-test and post-test by using of Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students

The students' learning achievement	n=30		
	Mean	Standard deviation	T-test
Pre-test	16.67	9.95	11.06*
Post-test	23.47	4.95	

\*statistical significance at the .05 level ( $\alpha = .05$ ,  $df = 29$ ,  $t = 1.699$ )

from the table 2, the students' learning achievement were comparison between pre-test and post-test, which were found in the pre-test of Mean was 16.67, and Standard deviation was 9.95, and also were found in the post-test of Mean was 23.37, and Standard deviation was 4.95. In conclusion of the students' learning achievement of post-test by using multimedia on e-learning with blended learning in e-commerce lesson was found higher than pre-test, was statistical significance at the .05 level

## 7. CONCLUSION

7.1 The efficiency of multimedia on e-learning with blended learning in e-commerce lesson was students was 80.48/84.40, which was higher than the specified criteria because the researchers were studied of designing By using the phases of the ADDIE instructional design process (Branch, 2009), and applied to the multimedia on E-learning consisted five phases were as follows: 1) Analysis phase 2) Design phase 3) Development phase 4) Implementation phase 5) Evaluation phase. The Multimedia on E-learning was designed through validation by experts of the content and the educational technology. The researchers were revised and improved developed of multimedia on E-learning until the research process completed, therefore used to implement in teaching and learning instruction. This research was consistence with the research of (Yingkwanchaoen, 2013) was done on The development of Blended Web-Based Lesson on “Lighting for studio Photography” for under graduated student with personality different was found efficiency at 86.00/80.76 which conforms to threshold set, As a results of the researcher was developed of Blended Lesson and tools, which were, learning instruction in the regular class and learning, for learning in regular class was support students on extermination and authentic practice, and on web-based lesson for the instructional media was used in this research consisted of video multimedia and rehearsed simulation game which students were responsibility feedback to all easily to understand. The illustrations of content needed to support were obvious and easy to understand and the independent content can applied the appropriate students’ knowledge and skills, and also the student can review of the lessons when the students’ needs including students’ learning styles to apply blended web-based lesson with teaching-learning collaboration in the classroom to increase of students’ comprehensive understanding.

7.2 The students’ learning achievement of post-test by using multimedia on e-learning with blended learning in e-commerce lesson was found higher than pre-test, was statistical significance at the .05 because e-learning was easy to understand and motivate to learning. The research was consistence of Boyle et al. (2003) he was used blended learning with online resources with tutorial support found learning with online learning assist to achieve of individual students’ learning was more than just only traditional learning.

## 8. RECOMMENDATIONS

8.1 The Multimedia on E-learning with Blended learning in E-commerce lesson for undergraduate students, as the results, was higher the students’ learning achievement. Therefore can provide guidelines for the design and implementation of blended learning through technology, media and networks for the other courses and for the future research that are appropriate with the content and the learning objectives, and also can help in teaching and learning instruction for more effective and more interesting.

8.2 Should be consider of the internet network system availability that is prepared of the encourage places and facilitate to teaching and learning instruction to be the most effective. In addition, the teachers have to stay update on the technology trends and teaching practices to apply in teaching and learning instruction to increase of students’ knowledge and skills.

## REFERENCES

- [1] Bernath, R. (2012). Effectives Approaches to Blended Learning for Independent Schools. *Websites*, Retrieved October 11, 2018, from <http://www.testden.com/partner/blended%20learn.html>
- [2] Boyle, T., Bradley, C., Chalk, P., Jones, R. & Pickard, P. (2003). *Using blended learning to improve student success rates in learning to program*. Journal of Educational Media, 28(2-3), 165-178.
- [3] Graham, C.R. (2012). **Introduction to Blended Learning**. *Websites*, Retrieved November 2, 2018, from [http://www.media.wiley.com/product\\_data/excerpt/86/C.pdf](http://www.media.wiley.com/product_data/excerpt/86/C.pdf).
- [4] Nasongkhal, J. (1999). *Teaching via the World Wide Web*. Chulalongkorn Education Research Journal, 27(3), 35-44
- [5] OECD. (1997), **OECD Report on Regulatory Reform: Synthesis**, Paris. Copyright OECD, 1997.
- [6] Partnership for 21st Century Learning, (2015). *Websites*, Retrieved December 15, 2018, from <https://www.imls.gov/assets/1/AssetManager/Bishop%20Pre-Con%202.pdf>
- [7] Pomwong, C. (2013). *Developmental testing of media and instructional package*. Silpakorn Education Research Journal, 5(1), 1-20.
- [8] Silpcharu, T. (2006). *Research and statistical analysis with SPSS*. Bangkok: V.Interprint.
- [9] Wannapiroon, P. (2011). *Blended learning from concept to practice*. Journal of Vocational and Technical Education. 1(2), 43-49.
- [10] Yingkwancharoen, A. (2013). *Development of blended web-based lesson on “lighting for studio Photography” for under graduated student with different personality*. Journal of Veridian E-Journal, 6(2), May - August 2013.

## The Enrollment Advantages of Meditation for Life Development Course: A Case Study of King Mongkut's Institute of Technology Ladkrabang Students

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### ABSTRACT

This survey research aimed 1) to study the enrollment advantages of Meditation for Life Development course to the students, and 2) to compare the benefit levels of students after the enrollment of Meditation for Life Development with the criteria. The samples used in this research were 120 undergraduate students at King Mongkut's Institute of Technology Ladkrabang, the second semester in the academic year 2018, consisting of 120 students in a classroom selected by using cluster random sampling. The research instrument was a questionnaire about the enrollment advantages of Meditation for Life Development course that divided into 2 parts as follows: The first part was Check List which consists of 8 items with Index of Item-Objective Congruence (IOC) between 0.67-1.00 and the overall reliability of 0.74. The second part was the Narrative Form. The quantitative data were analyzed by using statistics; mean, standard deviation and hypothesis testing by Nonparametric statistics which was determined the statistical significance at the .05 level. The qualitative data were analyzed using content analysis and analytic induction.

The research results found that;

1) The students could get the enrollment advantages of the Meditation for Life Development course both each item and the overall were at a high level. In addition, the qualitative data analysis showed that the advantages of enrollment in this course that summarized in 3 aspects; 1) Meditation helps to develop their personality 2) Meditation helps to improve the mental powers, and 3) Meditation helps to develop their mindfulness and intellectual powers.

2) The advantages after finishing the Meditation for Life Development course were at a high level which was higher than the determined criteria with the statistical significance at the .05 level. ( $Z=9.519$ ,  $p\text{-value} = < .001$ )

**Keywords:** Meditation, Meditation for Life Development, Nonparametric statistics, Student, Phraprommongkolyan (Luangphor Viriyang Sirintharo)

## 1. INTRODUCTION

On account of today's society, there are Hi-Technological progress, the environmental fluctuations and the fast-paced lifestyle of the people that caused the people to have to compete with both themselves and others. Moreover, it causes a lot of inequality in society that makes many people feel stressed and have depression. According to a survey conducted by the Department of Mental Health found that the number of depressive patients about 1.5 million people in 2017, by calculated with the number of population in 2018 who were aged 15 up) [1] [2]. In addition, the number of patients that are estimated from the prevalence of the survey is 1,448,913 people and the suicide rate survey of the whole country in 2018, calculated by the population of 65,406,320, there were 3,327 dead men and 810 dead women. So, the total was 4,137 people that equivalent to the rate of 6.32 per one hundred thousand people. This is considered to be a fairly high number and there were many cases that did not get exploration or there were many groups of people who attempted suicide but it did not work. [3]

Suangmon Sittisaman [3] mentioned the incident at the beginning of the year 2019 which was shocking news for parents and Thai society about many students did serial commit suicide. In just a week, there were 6 students from 6 educational institutions jumped down from a tall building to commit suicide and they chose a place of suicide as a school building or dormitory. Shortly thereafter, there was news of a high school student who decided to jump into a pond to commit suicide. By writing a letter said that he was on probation and did not want to repeat the same class again. Therefore, he decided to commit suicide in order to escape the problem in the future.

With concern students who will be the manpower of the country in the future. Many educational institutions are getting to realize the importance of preventing these conditions. Thus, King Mongkut's Institute of Technology Ladkrabang started improving the courses by focusing on soft skills in life and society to be clearer than ever. Since 2014, they have established a department that was responsible for skills development in life and society directly, that is the School of General Education (General Education), which has been approved by the establishment of the Council of King Mongkut's Institute of Technology Ladkrabang in the 12<sup>th</sup> meeting / 2014 on November 26, 2014 and has been announced in the Government Gazette, page 12, volume 131, as the special section: 262, on December 23, 2014, which had the duty of Federal agency on management of teaching courses in general education institutions, including planning the courses development, teaching and evaluation of students' learning [4]. As the Meditation for Life Development course is a new course in the group of values of life. The purpose is to let students know the meaning of meditation, the purpose, the methods, the steps, and starting points of meditation. Moreover, they will learn about the characteristics of meditation, how to make the meditation, the benefits of meditation. Then, they can apply it for use in their daily life including it will help them to concentrate on education and work as well.

As the instructional process, there will be both theory and how to do meditation correctly which is a course according to the good intention of Phraprommongkolyan (Luangphor Viriyang Sirintharo) who was the founder of the Willpower Institute which has the main objective to disseminate the right concentration in the country and all over the world to make peace. This is a course that will make students have balance both body and mind because meditation can decrease the bad temper and control the mind that makes the people live together happily. [5]. In addition, the research team is the lecturers who taught this course and we are also interested to do the survey research in order to get the empirical information about the advantages that the students gained from this course. This will be the basic data to support the instructional



process development and encourage the students and staff in the institute to see the value and advantages of meditation in order to make them stronger and control their own minds properly. Then, they can adapt it to use in their life and learning in the present and future.

## 2. OBJECTIVE

1. To study the advantages of learning Meditation for Life Development course to the students.
2. To compare the level of advantages that students received after learning Meditation for Life Development course with the criteria.

## 3. RESEARCH HYPOTHESIS

The students took advantage after learning the Meditation for Life Development course at a higher level.

## 4. RESEARCH METHODOLOGY

The research of the enrollment advantages of Meditation for Life Development course, a case study of King Mongkut's Institute of Technology Ladkrabang students was a survey research by using the research methodology as follows:

### 4.1 THE POPULATION AND SAMPLES

The population used in this research was 296 undergraduate students in 4 classrooms at King Mongkut's Institute of Technology Ladkrabang, the second semester in the academic year 2018.

The samples were 132 undergraduate students in a classroom at King Mongkut's Institute of Technology Ladkrabang, the second semester in the academic year 2018, selected by using cluster random sampling.

### 4.2 RESEARCH INSTRUMENT

The development of a research instrument was a questionnaire about the enrollment advantages of Meditation for Life Development course, divided into 2 following parts:

The first part was the questionnaire that developed by the research team on the learning content of the meditation advantages that was a Check List which had a rating scale of 1-4; as the details below:

- 4 means the highest level of taking advantage.
- 3 means the high level of taking advantage.
- 2 means the low level of taking advantage.
- 1 means the lowest level of taking advantage.

This consisted of 8 items with Index of Item-Objective Congruence (IOC) between 0.67-1.00 and the overall reliability of 0.74 which was a high level of reliability. [6]

The second part was the Narration Form to describe individual opinions about meditation advantages.

### 4.3 Data collection

Data collection of this research was the questionnaire on the enrollment advantages of Meditation for Life Development course, collected at the last hour of the course by distributing 132 sets of questionnaires to students, but handed back only 120 sets, representing 90.91 percent.

## 5. DATA ANALYSIS

1) The analysis of the enrollment advantage of Meditation for Life Development course with the quantitative data by using statistics; mean, standard deviation. There are criteria of interpreting the analysis results as follows:

Scale level of 3.51 – 4.00 means the highest level of taking advantage.

Scale level of 2.51 – 3.50 means the high level of taking advantage.

Scale level of 1.51 – 2.50 means the low level of taking advantage.

Scale level of 1.00 – 1.50 means the lowest level of taking advantage.

2) The analysis of the enrollment advantage of Meditation for Life Development course, with the qualitative data by using content analysis and analytic induction. [7]

3) The comparison of the advantage levels that students received after learning the Meditation for Life Development course with the criteria by using Non-parametric statistics on the One-Sample Wilcoxon Signed Rank Test, determined the statistical significance level was at .05.

The reason of using the One-Sample Wilcoxon Signed Rank Test statistics because the researchers analyzed the distribution of the normal curve of population by Kolmogorov-Smirnov Test found that the significance level of (Sig. 2-tailed) = <.001, which is less than the significance level of .05, therefore we accepted the assumption that the data did not have a normal distribution at the .05 significance level, so it was not according to the basic rule on parametric statistics.

## 6. CONCLUSION

### 6.1 THE STUDY RESULTS ON THE ENROLLMENT ADVANTAGE OF MEDITATION FOR LIFE DEVELOPMENT COURSE AS THE TABLES BELOW:

**Table 1.** Mean, standard deviation, and scale level of taking advantage of Meditation for Life Development course.

The enrollment advantage of Meditation for Life Development course	Mean	S.D.	Level
1. Always sleeping well	3.23	0.53	High
2. Being smarter	3.16	0.47	High
3. Being more careful before start working	3.23	0.53	High
4. Be able to control the temper well	3.28	0.61	High
5. Be able to handle when feeling stressed	3.09	0.65	High
6. Being happy	3.42	0.56	High
7. Being kind and gentle	3.43	0.55	High
8. Being good and merciful	3.48	0.50	High
Total average	3.29	0.32	High

As the table 1, we found that the students took the enrollment advantages of Meditation for Life Development course, the overall and each item were at a high level (Mean= 3.29, S.D. = 0.32). The highest advantage item was being good and merciful (Mean= 3.48, S.D. = 0.50), followed by the item of being kind and gentle (Mean= 3.43, S.D. = 0.55), and the item of being happy (Mean= 3.42, S.D. = 0.56) respectively.

The study results on the enrollment advantage of Meditation for Life Development course with the qualitative data as the table below:

**Table 2.** The enrollment advantage of Meditation for Life Development course according to individual opinions.

The enrollment advantage of meditation for life development course	Number of informant (persons)
Be able to more control the temper, be patient, feeling calm down	52
Being more conscious	51
Focusing on learning, reading, doing exams and tasks including more concentrating with things that want to do	30
More calm down	19
Being more careful and more considering before doing	18
Feeling relaxed	12
Precaution	8
Be able to handle the problems, find ways to solve any obstacles properly and also solving immediate problems by knowledge	6
Having more positive thinking	6
Being bright and cheerful	6
Being happier	6
Being better memorize	5
Do not worry too much and let it be	4
Feeling relaxed and relieved	4
Sleeping well	4
Doing meditation properly, practicing in the right way as well as getting knowledge	3
Being more gentle	3
Being more merciful	3
Having better health care	3
Being more disciplined and more responsibility	2
Having more rational	2
More understanding of life and the truth	2
Having merit (through Metta chanting)	2
Having a good personality	1
Being cheerful	1
Having better mental health	1
Making more merit	1

As table 2, based on individual opinions of students, it can be summarized that the enrollment advantages of Meditation for Life Development course in 3 parts as follows:

1) The meditation helps to improve the students' personality such as doing meditation properly, getting more knowledge, sleeping well and having better health as the opinion of students said that:

*".....I did meditation properly and got more knowledge."*

*The 62<sup>nd</sup> student*

*" Feel relieved and no stressful, when I was not stressful, so I felt so happy and had good health."*

*The 23<sup>rd</sup> student*

*" .....I had no stress before going to bed, so I slept very well."*

*The 31<sup>st</sup> student*

2) Meditation helps to improve the mental powers for example controlling the temper properly, not feeling anger easily, being more patient, being calmed down, being disciplined and more responsible, having more rational, being gentle and feeling sympathy with others and having merit, always making merit, feeling relaxed, being optimistic, having better mental health and be happier as the opinion of students said that:

*"I had been refined, controlled the temper and stressful properly, was more optimistic in life as well as I enjoyed and got along with others that made me happier."*

*The 71<sup>st</sup> student*

*"It made me focus on everything that I want to do in my life, be steady and calm, having a good mood and I could better tolerate things."*

*The 2<sup>nd</sup> student*

*"I felt calm down and paid attention to things, concentrated on the study that made me more understand in the lesson, not greedy and having a conscious. If everyone could do the meditation, I think our world will be peaceful, definitely."*

*The 21<sup>st</sup> student*

*"After making meditation, I felt like I had more conscious to do things, no bad temper during working or learning. I was less stressful and controlled my temper better. So, I did my tasks properly, had a better point on the exam, I felt very happy and felt like getting merit as well."*

*The 97<sup>th</sup> student*

3) Meditation helps to improve the mindfulness and intellectual powers. The students have concentrated on studying for an exam, doing homework and the examination including all tasks. They could memorize things better, had a conscious, was not careless, thought before doing, was able to solve any problem properly, more understood in life and law of nature and just let it be. As the opinions of students said that:

*"I had more conscious to do my own things in daily life, not careless when driving, felt relaxed and no stressful even if it did not help too much but made me feel happier. Moreover, I could memorize the lesson contents better and get ready for the exam."*

*The 39<sup>th</sup> student*

*"I was as an ADHD person (Attention-deficit hyperactivity disorder), less conscious or unable to focus on my tasks, after practicing meditation for a while, I become a conscious person who can concentrate on working and doing homework. I feel relaxed, calm down and more understand to study for an exam also."*

*The 98<sup>th</sup> student*

*"I had more conscious, was a thoughtful person that made me more understanding everything in life."*

*The 22<sup>nd</sup> student*

*"Learning to do meditation helps me to understand Buddhism better ... When there were some troubles in my life that made me stressful, I thought that it was not a big deal. We could handle it and not worry too much as the past."*

*The 107<sup>th</sup> student*

*"I could control my temper properly, did not worry too much and just let it go. When having some problem, I could have a conscious to solve it, tried to not concern about it too much and pull myself out of the problem. That made me calm down and be happier. After that, I could find ways to solve it properly by using my thought than emotion."*

*The 55<sup>th</sup> student*

## 6.2 THE COMPARISON OF SCALE LEVEL ON THE ENROLLMENT ADVANTAGES OF MEDITATION FOR LIFE DEVELOPMENT COURSE WITH THE CRITERIA. (OVER THAN 2.51)

**Table 3.** The comparison results of scale level on the enrollment advantages of Meditation for Life Development course with the criteria.

Items	Mean	Median	Z	p-value
1. Always sleeping well	3.23	3.00	9.817	< .001*
2. Being smarter	3.16	3.00	8.770	< .001*
3. Being more careful before start working	3.23	3.00	8.532	< .001*
4. Be able to control the temper well	3.28	3.00	7.824	< .001*
5. Be able to handle when feeling stressed	3.09	3.00	5.488	< .001*
6. Being happy	3.42	3.00	9.092	< .001*
7. Being kind and gentle	3.43	3.00	9.276	< .001*
8. Being good and merciful	3.48	3.00	9.817	< .001*
<b>Total mean</b>	<b>3.29</b>	<b>3.25</b>	<b>9.519</b>	<b>&lt; .001*</b>

\*Statistical significance at the level of .05

As the table 3 found that the comparison results on the enrollment advantages of Meditation for Life Development course with the criteria that was at higher level of 2.51, analyzed by One-Sample Wilcoxon Signed Rank Test, it showed that the students took the enrollment advantages of Meditation for Life Development course at a high level (mean = 3.29, median = 3.25) which was higher than the determined criteria with the statistical significance at the .05 level. (Z=9.519, p-value = < .001).

## 7. DISCUSSIONS

### 7.1 STUDY OF THE ADVANTAGES OF MEDITATION FOR LIFE DEVELOPMENT COURSE

The results showed that students took advantage of Meditation for Life Development course. The overall and each item is at a high level. The three most advantage items such as being good and merciful, being gentle and being happier respectively. Regarding the qualitative data, the students gave the opinions that the greatest advantage of meditation was to make them control the temper properly, not easily angry, be patient ,calmer down, being conscious, focusing on learning and working, having a good memory which helps to

improve the mental powers, mindfulness and intellectual powers due to the Meditation for Life Development course, the students learned both theory and practical parts. As the theory parts, they could learn and understand the ways including techniques to do meditation properly. About the practical part, they did walking meditation in 15 minutes and meditated in 15 minutes at school and home continuously throughout a semester. Thus, meditation helped to improve themselves in many ways. This was be measured at a high level consistent with the research of Sutthilak Sutthi [8] that analyzes the achievement of meditation teaching of Luangphor Viriyang Sirintharo because there were many factors for instance the course management, the media management with public relations, the teaching methodology in accordance with the curriculum, the personnel management with planning, the management through the Willpower Institute and the foundation. As the result of Luangphor Viriyang Sirintharo's meditation course, it was good to a person who did mediation such as sleeping well, feel more relaxed, having a good health, no illnesses, being smarter, being sensible, relieving stress. Therefore, meditation is beneficial in daily life and also affects society. In the case that people in society become more conscious. It will make society more peaceful and livable. According to the research of Suruyan Sattayakum [9] which studied the effects of Anapanasati Meditation on learning behavior in Middle school, Grade 9 at Watpratumwanaram School, Bangkok. The results showed that after attending the Anapanasati Meditation program, students will focus more on their studies with statistical significance at the level of 01.

## **7.2 COMPARISON OF THE SCALE LEVEL OF THE ADVANTAGES OF MEDITATION FOR LIFE DEVELOPMENT COURSE AFTER LEARNING WITH THE CRITERIA.**

The comparison of the scale level of the advantages of Meditation for Life Development course after learning with the criteria that higher than 2.51 found that overall, they received the advantages after finishing class at a high level (The mean is 3.29, the median is 3.25). This was higher than the specified criteria, was determined the statistical significance at 0.05 level ( $Z = 9.519$ ,  $p\text{-value} = <.001$ ). According to learning in Meditation for Life Development course, the students learned both theory and practical parts in the classroom and they had to continually do meditation at home for a semester. This affected them to improve themselves in many ways. This was be measured at a high level and it was higher than the specified criteria because the instructional methods in this course are the principle of Phraprommongkolyan (Luangphor Viriyang Sirintharo) who was the founder of the Willpower Institute, He aimed to publicize the right concentration for peace in the country and worldwide which consistent with the research of Somboon Watana [10], which compares research on academic achievement in meditation according to Buddhism philosophy. It was found that the achievement of learning after joining the project was significantly higher than before attending the program at 0.05 level ( $t = 12.718$ ). As the opinions and suggestions of this research found that the most of samples were pleased with this project, they said that it could help to develop their mind, be more conscious, concentrating, calm down, and feel happier than the past.

## **8. SUGGESTIONS**

Regarding, the research found that students received advantages from learning Meditation for Life Development at a high level. The three most useful points are meditation makes them being good and kind person, being gentle and being happier respectively. As the qualitative data, students gave the opinion about the greatest advantage of meditation was helping to control their temper when getting anger, being patient, calm down, being conscious, focusing on studies, works, and having a better memory. These are considered to be the mental power development, mindfulness and intellectual powers that were the advantages

obviously as well as these were great importance that we would like the students received because they are the next generation who will develop and lead the country to be better in the near future. Therefore, Educational institutions should support them to know the principles of meditation correctly and continuously. It will help them to be strong and be encouraging them to keep going. In addition, they know how to deal with their temper and are conscious when facing any problems or emergencies that caused the depression. This will prevent them from the beginning, rather than solve them at the end.

## REFERENCES

- [1] Suangmon Sittisaman. 2019. **The suicide boy, due to the education system or family**. Retrieved March 20, 2019, from <https://www.dmh.go.th/news-dmh/view.asp?id=29580>
- [2] Depression Research and Information Center, Phra Si Mahapho Hospital, Department of Mental Health. 2019. **Report on access to services of depressive patients of fiscal year 2020, March 2019 (HDC database) (by calculated the population in 2018)**. Retrieved March 10, 2019, from [http://www.thaidepression.com/www/report/main\\_report/](http://www.thaidepression.com/www/report/main_report/)
- [3] Strategy and Planning Division, Department of Mental Health, Ministry of Public Health. 2019. **The number of suicide victims, classified by province, 2018**. Retrieved March 25, 2019, from <https://dmh.go.th/report/suicide/download/view.asp?id=172>
- [4] School of General Education, KMITL. 2019. **General Education Courses Version 59**. Retrieved March 20, 2019, from [www.http://gened.kmitl.ac.th/](http://www.gened.kmitl.ac.th/)
- [5] Bawonsak Uwanno and others. 2019. **Textbook of Meditation for Life Development course**. Samut Prakan : Chanwanich Security Printing.
- [6] Punnee Leekitchwatana. 2015. **Educational Research Methodology**. 11th ed. Bangkok: Mean Service Supply.
- [7] Ong-art Naiyapatana. 2008. **Quantitative and qualitative research methodologies in behavioral and social sciences**. 3rd edition. Bangkok : Chulalongkorn University Printing House.
- [8] Sutthilak Sutthi. 2017. Meditation and the enhancement of willpower : an analysis of the meditation teaching method of Phradharmamongkolyana (luang phor viriyang sirindharo). **Journal of Graduate Studies Review**. 13(3), Special Issue, p. 101-112.
- [9] Suriyan Sattayakum. 2012. **The effect of Buddhist meditation practice on the attentive behavior of mathayom suksa 3 students of Watpratumwanaram school in Bangkok**. Master of Education Degree in Guidance and Counseling Psychology, Srinakharinwirot University.
- [10] Somboon Watana. 2015. Learning achievement of practice of Buddhist meditation course. **Journal of Graduate Studies Valaya Alongkorn Rajabhat University**. 9(3), p. 46-56.



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## 2. Main Research Paper Structure

### Part 1 consists of

<b>1.1 Title</b>	Thai and English should be shortly represented on the research goals
<b>1.2 Authors</b>	Responded author and co-authors in Thai and English giving first name and last name but no title and referring by number.
<b>1.3 Abstract</b>	Thai and English should be shortly focused and directly scoped on the research objective, research methodology and the research summary. It should not exceed 250 - 300 words.
<b>1.4 Keywords</b>	Thai and English should choose keywords related to article.

### Part 2 Contents

#### - Introduction

It is very important part and reason to guide the readers to understand of the research. It should be directly and shortly present the contents, objectives, methodologies, and the results of the research. It should not be written more than 250-300 words.

#### - Objectives

#### - Hypothesis (if applicable)

#### - Scope of Research

#### - Research Methodology

#### - Results (It should show the results in statistically significant according to objectives.)

#### - Discussion (It should present the reasons of the results as it is or compare to other writer's results.)

#### - Conclusion (Give the conclusion based on the results and the discussion.)

#### - Acknowledgement (If applicable)

No needs to put the number for this content and use the same size letter

#### - Suggestion (If applicable)

### Part 3 References

#### - References

The APA reference style must be used as the requirement of Journal of Industrial Education. The references are only referred in the research paper to be in this reference part. The Number reference style should be applied for the whole subject. The writer is to be responsibility for the correction and the copy right of referring in the research.

#### Format to distribute Number reference style

The direction of Number reference style as follows

1) Put the number after the context or the other referred author and arrange them in order to [1],[2],[3],[4]... until complete without rearranging the letters and no need to order the references by Name, Language, and Type of documents.

2) If the references are the same source, using the same number which is used to used, it should be showed in the reference part at the end of the article.

### 3. Printed Format

#### 3. Printed format

##### 3.1 Thai and English Research Paper

**Paper setting** (6 - 10 pages (NOT exceed 11 pages))

- Font Th SarabunPSK only
- paper size top 1 inch bottom 1 inch left 1 inch right 0.8 inch

**\*Please follow the Template file which can be downloaded as .....**

##### 3.2 Titles

In Thai and English. For English, using the Upper case (18 Bold inch)

##### 3.3 Author and Co-authors

It should write in all righted authors. Identify the responded author with email. (15 Bold inch)

##### 3.4 Abstract and Contents

- Abstract is written in 14 bold inch and place it on the left side.  
The word Abstract, only letter A is upper case and others are in 14 inches with 1 column.
- Contents are in 1 column with the headline in 16 bold inches and sub headline is in 14 bold inch.  
The contents are in 14 inches and given in 5 spaces.

##### 3.5 Keywords): Fonts size 14 inches.

##### 3.6 Figure and Table

1. Leaving 1 row before inserting the table and giving 1 row before writing the information for the table in details.
2. Uses "Table ..." at the left corner with font 12 bold inch.
3. Table name is in font 12 inches and if the table detail is longer than 1 row, it should be started with new row by the same starting column.
4. Using only in column table as opened the left and right alignments.

**Table 1** (Table name is in 12 inches.)

Title (12 bold inch.)	Title	Title	Title	Title
Content (12 inches.)	Content	Content	Content	Content
Content	Content	Content	Content	Content

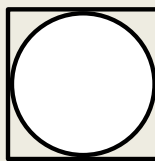


Figure 1 ..... (Font is in 13 inches with in center column)

##### 3.7 Discussion part in 16 inches.

At left column for contents. For first row in each paragraph, it has to give 4 word-spaces (font in 14 inches.)

##### 3.8 Conclusion part in 16 inches.

At left column for contents. For first row in each paragraph, it has to give 4 word-spaces (font in 14 inches.)

##### 3.9 Acknowledgement in 16 inches. Without putting number in front of topic (Font in 14 inches.)

No needs to put the number for this content (font in 14 inches.)

### 3.10 References title font in 16 inches.

(Content font is in 14 inches.)

### 3.11 $\bar{X}$ and Table Format

- Create your own table in column and Do Not Copy table form from other file sources.
- Use  $\bar{X}$  as only in this following size  $\bar{X}$  (S.D.) ( $\bar{X} \geq 3.50$ ) ( $\bar{X} = 4.51$ ).

### 3.12 Sub title format (Example)

#### 1. Title (ขนาด 16 พท)

1.1 Sub title (6 word-spaces in 14 font inches.)

1.1.1 Second sub title (alignment as the first word of sub title in 14 font inches.)

1.1.1.1 Third sub title

(1) sub title of 1.1.1.1

(1.1) sub title of (1)

## Paper preparing /Paper submitting for publishing in Journal of Industrial Education

For correction, perfection, and time saving, paper submission for publishing in Journal of Industrial Education is needed to follow as this guideline.

1.1 Printed and typed in A4 paper size for 6-11 pages with one column style. By using Microsoft Word for Windows 2007, it is highly recommended the word processing software that fits in the Journal of Industrial Education format guideline according to our time saving for paper proof and publishing.

1.2

1.3 The original or submitted paper must be only formatted as the Journal of Industrial Education printed format. **If NOT follows as directions, the author is informed and the paper will NOT be stepped any forward.**

1.4 Paper is needed to be clear in contents and pictures.

1.5 Paper is Not published or Not printed in any sources such as journal, conferences, so on.

1.6 The author is fully responsibility to prove the correction of any requirement of Journal of Industrial Education format.

1.7 Typing or writing journal application form and attach transfer receipt.

1.8 Filling and signing on form to submit industrial education journal article. The first name is the author name, then the second to sixth are advisor names and so on.

1.9 Preparing and submitting paper is noted as forms. URL/ <http://www.tci-thaijo.org/index.php/JIE>

1.9.1 SCAN PDF FILE AND MICROSOFT WORD(.doc. or .docx.) to database and naming the files separately.

1.7 Completely fill out the member form of Journal of Industrial Education.

**Scan it, attach it to ThaiJo system, and post confirmed mail.**

1.8 Completely transferred the member fee for Journal of Industrial Education.

**Scan it, attach it to ThaiJo system, and post confirmed mail.**

1.9 Completely fill out the submitting form for Journal of Industrial Education with requirement in 1.6

**Scan it, attach it to ThaiJo system, and post confirmed mail.**

1.10 For the preparing and submitting paper, please see the direction and guideline of Journal of Industrial Education as URL <http://www.tci-thaijo.org/index.php/JIE> (Guideline is also in website).

**Contact us**

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#### 4. Paper Submission is ONLY on ThaiJo

If the author DOES NOT follow as the direction, paper will NOT BE considered!

**\*\*\*\*\*Link...Important needs\*\*\*\*\***

- ① JIE Member form: <https://drive.google.com/file/d/1Z4b8yuemMYTwpsEnnDzzlHLkPADurUGx/view>
- ② Paper submitting form: <https://drive.google.com/file/d/1ZMWINIA5BjFiOqHHvP2KOZwbngA6c5Zq/view>
- ③ Template **paper format**: <https://drive.google.com/file/d/1J6955l2yCkoQRWuDAueun6C-RPBWcU5V/view>

**\*\*\*Contact us if you have any questions\*\*\***

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