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Research Article

The Need for Blended Learning Development to Enhance the Critical Thinking of Thai Vocational Students

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Abstract

The objective of this research was to evaluate the need for blended learning development to enhance the critical thinking of students. Selected by using multistage random sampling, the 450 samples comprised of 376 vocational students and 69 teachers at vocational level. The research instrument used was a needs evaluation form, which was necessary to improve blended learning to enhance critical thinking. The index of consistency (IOC) was between 0.56 -1.00, and the total reliability was 0.94. The research was conducted and data collected from July 2018 to August 2018. 445 completed evaluation forms, 98.88% of the total sent out, were returned to researchers. Frequency, percentage, PNI(Modified), and content analysis were used to analyze the data. The research results showed that the vocational students and teachers agreed on the same point that there should be development of student critical thinking skills. This development should comprise of critical thinking skills, learning achievement, and learning management. The recommendations made for improvement were to increase discipline within educational institutes, and to change and add facilities to support modern learning styles. Testing styles should be modern and correspond to student contexts. Moreover, learning styles should be improved to be up-to-date and to correspond to students' needs and their real lives.

Keyword; *Needs evaluation, Blended learning development, Critical thinking skills, Vocational students, Teachers at vocational level*

1. Introduction

Nowadays, the advancement of technology highly affects change in society, and unavoidably affects Thai society, both directly and indirectly. As a result, Thailand needs to be hurriedly developed to improve the skills of the people for a changing world. To develop people, education should be effective, and learning management must cover a multidimension of learning. More importantly, it should correspond to the Twelfth Education Plan, Issue 12, which aims to improve thinking skills. The importance of necessary key skills in the 21st century is in line with the Eleventh National Economic and Social Development Plan (2017-2021), which aims to strengthen Thai society so that Thailand can stand firm. In order to complete this objective, science and technology need to be improved rapidly. Research and innovative development are key factors in driving development, corresponding to the National Education Act B.E. 2542 and the additional amendment (Third edition) B.E. 2553. Learning management principles are conducted to improve Thai people, who are full of strength, mentality, knowledge, morality, and ethics. Learning styles aim to educate consciousness and enhance critical thinking. Ministry of Education (2014: Online)

aims to improve learners' wisdom, to know, to learn, to have creative thinking and managing capability, including making decisions and solving problems, and pursuing new ways to improve themselves, as well as adopting knowledge to create works which correspond to a career and to continuous development.

Therefore, it is important to develop thinking skills in the Thai youth, especially critical thinking skills. Critical thinking skills allow students to think reasonably. They can speculate, realize, analyze, synthesize, evaluate, and decide about information or conditions by using their knowledge, thoughts, and experiences to solve such problems. This relates to Paul & Elder (2005); critical thinking skills are very important for the modern world. Facione (2007: Online) also stated that critical thinking skills involve thinking with goals in mind. Black (2007: 7) also indicated that critical thinking skills involve thinking analytically with reason and shows the credibility of each context. Boss (2010: 4) stated that critical thinking skills apply the rules of logic, assessment, and decision making for work planning. Bassham & et al. (2011: 9) also stated that critical thinking skills show the ability to understand, which clarifies, analyzes, and evaluates arguments. It can be seen in a statement without bias, supported by appropriate reasoning and credibility. Many university students have concluded that critical thinking skills comprise the following five elements: problem definition, thinking destination, hypothesis indication, knowledge diagnosis, and evaluation and decision.

Accordingly, the abovementioned statements reflect the importance of critical thinking skills, which have to be applied to students at every level, especially with vocational students, because they form a significant part of society, and will soon attend to the economic system of the country. Critical thinking skills can indicate the quality of the student in this modern world, so that they can always be available for a society which learns anywhere and at any time. Critical thinking skills can lead to a way of life that understands change in the world. It is, thus, very important, and challenging, to people in the new era; however, it has been found that Thai students have a low degree of critical thinking skill. This is reflected in the V-NET test of 2017, in which, in the subject related to critical thinking, the rate was very low, and which needed to be adjusted. This accords with the school quality report and V-NET result of the Office of Education Region 1 in 2016. It can be concluded that the national average score is $\bar{x}$=41.60, the national main capacity and general capacity in vocation education level 3 is $\bar{x}$= 37.93, and the SD rate is 8.04 (NIETS 2017: 25). The school quality report, taken from the V-NET result of the Office of Education Region 1, academic year 2017, also found a score is 44.75; when considering each province of Thailand, it was found that Ayutthaya province had a slightly lower score than the national score, at 40.82 (Office of Education Region 1, 2018: 38-39). According to the background and importance of the problem, the researcher is interested in developing blended learning to encourage the critical thinking skills of students. The researcher conducted a study and evaluated the need to develop a learning activity that would allow student gains in appropriate knowledge and information.

2. Objective

The objective of the research is to evaluate the need for blended learning development to enhance the critical thinking of students

3. Literature Review

3.1 Needs Assessment

Kaufman & et al. (1993) said that needs assessment is a process that identifies the gap between the present and a prediction and then sorts the significance of such a gap. The most important gap needs to be filled, related to Wongwanich (2005), indicating that needs assessment is an assessment process to identify the difference between real conditions and predicted conditions by identifying what will incline to happen and what the condition will be, and then assess it; then, the result is analyzed, and there is consideration of what will be changed. Needs assessment brings

information that leads to change in education management, or the change in such an environment. This change is a consequence of the needs assessment, and is a creative and positive change.

Considering the needs evaluation process, Wongwanich (2005: 103-105) concluded from the CARE ACT (referred to in WHITE, 2002) that there are four steps, as follows: 1) assessment planning, including scoping, assessment user determination, budget and method determination, collaborative responsibility determination, process management scope, community-cooperated process and support, assessment design (which comprises both secondary data and primary data study), information scoping, user determination, random sampling design, assessment method selection, and data tool design; 2) information analysis determination, involving interesting questions on related information, what further information needs to be collected, who is responsible for the data tools used and for checking the quality of it, if there are any tools that can be immediately used, what questions need to be placed, who collects the data, how to collect the data, when to collect the data, how many questions are placed, what topics, what process is used to verify the validity of the questions, how to supervise and check the quality of the data, how and when to store the data, how to analyze the data, and how to present the data to the team; 3) data collection, the planning that has already been designed- generally, it uses random sampling of a determinate population by specifying a case study and collecting data from the questionnaire, interview, and group process, and 4) analysis and result presentation- data analysis step and presentation, the basic formality of which is that the analysis method needs to be related to the nature of data and the presentation should be perspicuous.

Wongwanich (2005: 275-279) concluded the topic by conducting a dual-response format in which a questionnaire is in the form of an estimated value. One question needs to be answered as it is (I=Importance) and as it should be (D=Degree of Success), which are constructed within the definition of prioritization, the discrepancy model, and the needs prioritization process model by conducting the principle of difference assessment. The needs are calculated by Mean Deference Method (MDF) which finds out the means of I and D, called "rank order of deference scores" and prioritizes the importance by using the adjusted Priority Need Index (PNI), which Wiratchai and Wongwanich (Wongwanich, 2005) has adjusted. It is a process to find out the difference rate of I – D and divide it with D in order to control the scope of the needs. The equation is $PNI_{(modified)} = (I-D)/D$

3.2 Critical Thinking

Ennis (1985: 46) said that critical thinking is a process of thinking that is reasonable and has a goal to decide what is believable before doing it. The four significant elements are reasonable thinking, thought that the reasons of ourselves and others need to be investigated, thinking that emphasizes consciousness, and thinking that emphasizes the decisions of what to believe and what to do. Boss (2010: 4) indicated that critical thinking applies logical rules, evaluation, consideration, and decision in order to plan work. The paper Critical Thinking Learning Development of Plymouth University (2010: 1) stated that critical thinking means the questioning and answering of what is not right in daily life. Academically, the goal is to find out the truth by conducting theory and techniques which are continuously developed. Critical thinking is to try to answer questions systematically; Rattanathongkham (2013: 2) stated that critical thinking is the destined thinking of individuals through analysis, contemplation, commutation, and evaluation. Data is received from observation and experience dependent on knowledge, perspective, and reasonable thinking skills, which lead to reasonable conclusions and decisions. Examples and further descriptions can be given in order to support the decision of what to do or to believe.

As elements of critical thinking, Sternberg & Baron (1985) included problem definition and understanding, data decision, reference, and problem solution. This is related to Angeli & Valanides (2009) which summarized that the elements of critical thinking are problem analysis, problem solution scoping, and justification for each solution. Ennis (1990) inferred that the elements of critical thinking are subject identification, definition, interpretation, hypothesis indication, argument evaluation, credibility assessment of data source, value arbitration, practical decision, interaction, self-observation, and decision. Watson & Glaser (2008) made a summarization that the elements of

critical thinking are conclusion acceptance, deduction, interpretation, and argument evaluation. Norris & Ennis (1989) concluded that the elements of critical thinking are primary clarification, reference conclusion, deduction, induction, advanced clarification, information support, and strategy. The Center for Critical Thinking (1996) summarized that the elements of critical thinking are reasonable concepts, problem identification, thinking goals, hypothesis determination, data for thinking, and credible data.

3.3 Learning that encourages critical thinking

For learning that encourages critical thinking, Paul (1992: 75-76) suggested that there are three key elements; students must be capable enough, having experience, motivation, belief, values, and culture. Teachers act as facilitators, specialists, and models, and manage the class environment to be secure and open chances for students, accept their quality as human beings, and motivate them. This is related to McDonald (1993: 111-118), who indicated that the environments that encourage critical thinking are where students are required to be capable enough and have experience, motivation, belief, values, and culture. Teachers act as facilitators, specialists, and models for the students, and manage the class environment to be secure, and open chances for students, act comfortably, and accept the students' quality as human being and motivate them.

3.4 The role of the teacher in learning that encourages critical thinking

Clarke & Biddle (1993: 25-27) stated that teachers should act differently in this kind of learning, such as in the concept of Teacher as Researcher. Teachers should be likely to solve problems, develop new things, and be a model for the students. Teachers act as designers who are creative and discover new things for the students. Teachers act as consultants who advise on what should be known, and not act as ones who teach. Teachers act as referees who help students think and participate in their learning. Teachers act as analysts who analyze information, situations, and students in the classroom. Teachers act as judges who evaluate what is right or wrong in terms of what students do, and who can decide correctly. Teachers should act in multiple roles in order to manage learning that encourages critical thinking. The most important thing is that the teacher must facilitate learning, give students freedom of learning, and respect and listen to others' ideas.

For learning that encourages critical thinking, Kurfiss (1988: 187) indicated that an emphasis activities and practices can help students understand meaningful contexts. Students can find out questions or problems which lead to reasonable conclusions and decisions. Ennis (1990: 13-16) stated that the way to develop critical thinking is uses wide range of teaching separated from the mainstream. The content can be political, local, about other problems, or external knowledge, and is not necessarily confined to the classroom. Beyer (1985: 279–303) developed a way to develop critical thinking that comprises the encouragement of learning interactions of students, group practicing, and the use of critical questions or open-ended questions. This helps to encourage critical thinking, which builds a creative learning atmosphere. The techniques included in learning to develop critical thinking comprises Classroom Assessment Techniques, in which the students answer a question by writing in descriptive answers (Laoriandee, 2010: 31-32), Cooperative Learning Strategies (Bruner, 1995), the Case Study/Discussion Method, in which the teacher proposes case studies or problems for discussion, and the students conclude the discussion (McDade, 1995), and the Using Question Technique, in which the students ask and answer questions after the teacher's lecture (King, 2012).

4. Research Methodology

The population in this study was the 100 and 200,000 vocational students and teachers from vocational institutions in the central region of Thailand, Semester 1 of 2018 (retrieved from http://www.moe.go.th). The samples were calculated by using the equation of Yamane (1973: 1088). The credibility rate was 95%. The sample range was 450. After the samples were calculated, multistage random sampling was conducted.

The data tool uses was an evaluation form of the needs to develop blended learning to support the critical thinking skills of students in three aspects, which were critical thinking skills, study achievement, and learning management, summed up in 57 questions. The questions used a rating scale, allowing participants to answer according to the "present condition" and the "anticipated need". The IOC rate was between 0.56-1.00 and the credibility rate was 0.94.

The researcher collected data and used the personnel network in the area. The collection was conducted from July to August 2018. The completed questionnaires were received from 376 students and 69 teachers; a total of 445 questionnaires, or 98.88% of the ones sent out.

The researchers analyzed the data by finding out the frequency and percentage. To analyze the needs to develop blended learning to support the critical thinking skill of students, the researchers conducted a Modified Priority Needs Index: $PNI_{(Modified)}$ by practicing the following equation:

$PNI_{(Modified)} = (I - D)/ D$

When I is the score of the anticipated condition

D is the score of the present condition

5. Analysis of Data

1) The analysis of data, by frequency and percentage of the general data of the samples, are as shown in Table 1.

Table 1 Frequency and percentage of general data of samples (n=445)

General Information		Students		Teachers	
		Frequency	Percent	Frequency	Percent
Gender	Male	253	56.90	59	13.20
	Female	123	27.60	10	2.30
	Total	**376**	**84.50**	**69**	**15.50**
Class Level	Year 1	195	43.80	30	6.70
	Year 2	101	22.70	23	5.20
	Year 3	80	18.00	16	3.60
	Total	**376**	**84.50**	**69**	**15.50**
Major	Auto Mechanic	150	33.70	22	4.94
	Factory Mechanic	75	16.85	19	4.27
	Maintenance	75	16.85	5	1.12
	Other Mechanic	76	17.10	23	5.17
	Total	**376**	**84.50**	**69**	**15.50**

According to Table 1, it was found that the number of participants answering the questionnaire was 445, comprising 376 students (84.50%) and 69 teachers (15.5%), Most were male students (253, 56.90%) and male teachers (59, 13.20%), with first-year students (195, 43.80%), first-year teachers (30, 6.70%), Auto Mechanic students (150, 33.70%), and other mechanic teachers (23, 5.17%).

2) The analysis result of the needs to develop blended learning for the critical thinking of the students was conducted by analyzing $PNI_{(modified)}$, as shown in Table 2.

Table 2 Priority of needs to develop blended learning for the critical thinking of students; overview group (n = 445)

Aspects	I	D	I - D	$PNI_{(modified)}$	Priority
1. Critical Thinking	4.11	3.40	0.71	0.21	1
2. Study Achievement	4.20	3.60	0.60	0.17	2
3. Learning Management	4.21	4.18	0.03	0.01	3
Total	4.18	3.80	0.38	0.10	-

According to Table 2, it was found that the students and teachers of the vocational institution have

needs to develop blended learning for the critical thinking of students at the PNI $_{(modified)}$ rate of 0.10 in the aspects of critical thinking, study achievement, and learning management.

Table 3 Priority of needs to develop blended learning for the critical thinking of students; student group (n = 376)

Aspects	I	D	I - D	PNI $_{(modified)}$	Priority
1. Critical Thinking	4.10	3.36	0.74	0.22	1
2. Study Achievement	4.17	3.54	0.63	0.18	2
3. Learning Management	4.18	4.18	0.00	0.00	0
Total	**4.16**	**3.77**	**0.39**	**0.10**	

According to Table 3, it was found that the students of the vocational institution have the needs to develop blended learning for the critical thinking of students at the PNI $_{(modified)}$ rate of 0.10 in the aspects of critical thinking, study achievement, and learning management.

Table 4 Priority of needs to develop blended learning for the critical thinking of students; teacher group (n = 69)

Aspects	I	D	I - D	PNI $_{(modified)}$	Priority
1. Critical Thinking	4.19	3.64	0.55	0.15	1
2. Study Achievement	4.33	3.91	0.42	0.11	2
3. Learning Management	4.37	4.17	0.20	0.05	3
Total	**4.31**	**3.96**	**0.35**	**0.09**	

According to Table 4, it was found that the teachers of the vocational institution have the needs to develop blended learning for the critical thinking of students at the PNI $_{(modified)}$ rate of 0.09 in the aspects of critical thinking, study achievement, and learning management.

3) The suggestion analysis results of the needs to develop blended learning for the critical thinking of students were obtained by analyzing content, as shown in Table 5.

Table 5 Suggestion analysis result of needs to develop blended learning for the critical thinking of students was conducted by analyzing content

Suggestions	Analysis Results
- Every vocation institution should be more organized - Statistics for assembly activities should be conducted, such as morning assemblies or religious assemblies, as the number of students attending can be measured - There should be more finger scanners at the parking; in the afternoon, parking is always open.	There should be more discipline in the school
- There should be air conditioners. Lathe machine should be changed. Lunch should be free - Machines should be more up-to-date. There should be a dome building for assembly activities. Door locks should be stronger. Teachers should be more approachable and involved	Facilities should be adjusted and maximized to be more up-to-date
- Examination should be more up-to-date. New knowledge should be given - Test should not be too hard and be concordant with what the student studies. Learning media should be up-to-date and help students be active and interested. Teachers should add some jokes during the teaching - Sports such as basketball should be supported. The school has facilities, but a place is not provided - Learning equipment should be sufficient for the students	Test formats should be consistent and up-to-date with the student context
- There should be more learning activities. Teaching should be more profound and understanding. A fund for learning equipment should be raised. Teachers should listen more - There should be activities that are consistent with real life and problem solutions, because there is learning but no practical use involved	Learning formats should be up-to-date, according to the needs of the students and reality

According to Table 5, it was found that the suggestion of the needs to develop blended learning for the critical thinking and achievements of students were analyzed as followed: there should be more discipline in every school, facilities should be adjusted and maximized to be more up-to-date, test formats should be consistent and up-to-date with the student context, and learning formats should be up-to-date according to the needs of students and reality.

6. Research Result

1) The teachers and students of the vocational institutions have the needs to develop blended learning for the critical thinking of the students at the $PNI_{(modified)}$ rate of 0.10 in the aspects of critical thinking, study achievement, and learning management.
2) The students of the vocational institutions have the needs to develop blended learning for the critical thinking of students at the $PNI_{(modified)}$ rate of 0.10 in the aspects of critical thinking, study achievement, and learning management.
3) The teachers of the vocational institutions have the needs to develop blended learning for the critical thinking of students at the $PNI_{(modified)}$ rate of 0.09 in the aspects of critical thinking, study achievement, and learning management.
4) The students and teachers of the vocational institutions suggest that there should be more discipline in every school, facilities should be adjusted and maximized to be more up-to-date, test formats should be consistent and up-to-date with the student context, and learning formats should be up-to-date according to the needs of students and reality.

7. Discussion

According to the results, students and teachers from the vocational institutions need to develop the critical thinking skills of students. The needs rate ($PNI_{(modified)}$) was 0.10. However, in this evaluation, the research has reviewed many literatures and studied the context of vocational learning in Thailand, which is inclined to change according to the modern world. The researcher then analyzed the data and developed a needs evaluation form. The quality of the evaluation form was checked for validity by 9 professionals. Moreover, it was tested by 30 qualified participants in order to find reliability. Accordingly, these helped to qualify the evaluation form, and the samples could answer those questions according to the present condition. The needs evaluation form was divided into three aspects, which were critical thinking skills, study achievement, and learning management. (1) Critical thinking skills included the following questions: problem identification capacity, data credibility determination capacity, deduction capacity, induction capacity, primary agreement identification, induction reference, the ability to determine problem subjects, data collection capacity, data analysis capacity, data synthesis capacity, data evaluation and management capacity, hypothesis selection capacity, and conclusion capacity. (2) Study Achievement included the following questions: whether the test is in accordance with the content, if it was is in accordance with the objectives, if it was in accordance with learning standards, if it encouraged critical thinking, if the test system reflected the students' capacity, if the test system reflected critical thinking, if the test system was varied, if the test system was modern and used ICT, if the test system accorded with the student context, if the achievement truly reflected real knowledge, if the achievement truly reflected real capacity, if the achievement was accurate, if the achievement was an obstacle for studying, if the achievement reflected the capacity to think critically, and if the achievement related to the format of learning. (3) Learning management included the following questions: whether the activity encouraged real situations, if it encouraged vision, if the activity encouraged problem identification, if the activity encouraged conclusion identification, if the activity encouraged primary agreement identification, if the activity encouraged reason identification, if the activity encouraged appropriate questioning, if the activity encouraged individual thinking, if the activity encouraged classification, if the activity encouraged individual decision making, if the activity encouraged subdivision, if the activity encouraged solutions, if the activity encouraged reasonable conclusions, if the activity encouraged inductive conclusions, if the activity encouraged deductive references, if the activity encouraged prediction, if the activity

encouraged discussion, if the activity encouraged unsolved problem linkage, if the activity encouraged the option of using information related to the problems, if the activity encouraged various answers, if the activity encouraged hypothesis, if the activity evaluated various ways of thinking, if the activity evaluated reasonable decisions, if the evaluation related to reality, and if the activity evaluated application. Somintara & et al. (2018: 95-101) used an evaluation form of the needs to develop a creative thinking skills course, and found that there were 7 elements as follows: course documents, course content, course activity, teachers, media and innovation, evaluation, and students. They also found that the educational managers and teachers in the Office of the Secondary Education Area in Bangkok have the needs to develop a creative thinking skill course. The average rate of $PNI_{(Modified)}$ was 0.41; ranging from the highest to the lowest aspects, the order was students, course content, media and innovation, course activity, teachers, evaluation, and course documents. Naowanich & Wannaphirun (2012: 121-135) reported on blended learning format development by conducting the M-learning method to develop logic thinking for university students, and found that there were 3 steps, which were 1)before-class preparation, 2)learning management, and 3)learning evaluation. Chorungchun & Laoriandee (2011: 94-107) reported on the development of learning that develops critical thinking in grade 11 Science students, and found that there were 5 stages, which were a Preparation and Motivation Stage: P, a Learning the Thinking through Practice Stage: L, a Knowledge Organization Stage: O, an Application of the Thinking Process: A, a Summarization stage: S, and an Evaluation Stage: E. This was called the "PLOASE Model". Netrsopha (2017: 8) reported on the synthesis result of blended learning to encourage wisdom in secondary students by the R-C-A technique; there were 4 elements, which were 1) format principles, 2) format objectives, 3) learning activity, and 4) evaluation. The blended learning comprised two formats, which were offline and online learning activities. The stages of the blended learning were 1) a motivation stage, 2) a format stage, 3) discussion and conclusion, and 4) an evaluation stage. Experts suggested that the appropriation of the stages was very high. The motivation stage bore the highest rate. Others bear a high rate. Thorne (2003: 66) stated that the principle to design blended learning is as same as other styles in that it emphasizes a diversity of experience-supporting activities. Eryilmaz (2015: 255) reported on the study of blended learning efficiency, and found that students who study in blended learning have a higher score than ones who studied in situational learning, because students were interested and eager to discover new things by sharing knowledge with their friends. Seonghee. (2000) also found that blended learning is inclined to increase the study achievement of students via understanding activities. The analysis results found that the students' opinions in a blended environment varied when compared to other kinds of environments, and that the blended environment was more efficient than the online environment. Caner (2012:1-19) reported on the definition of blended learning in higher education and found that the blended learning includes other ways of learning. University education can be easy, according to the online information and content of the students or the online technology that can be applied in the one-on-one communication stage of the students. Also, blended learning includes synchronous or asynchronous online learning, various complex technologies, and online tools in many cases. It also includes the blending of the learning formats of face-to-face teaching and online teaching. Moreover, Twigg (2003) claimed that blended learning can replace additional content when using face-to-face learning and online learning. Akkoyunlu & Soylu (2008: 190) conducted a study of student's perceptions in a blended learning environment based on different learning styles, and found that students significantly commented on blended learning, when comparing according to Kolb's (1984) assimilators. This emphasizes logic and ideas, systematical planning, individual work, and learning by thinking and watching.

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