

# **Development of Web-Based Instruction Model by using Knowledge Management Process to Develop Self-Directed Learning Ability of Undergraduate Student**

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## **Abstract**

This research aimed to 1) develop model of Web-based Instruction (aka WBI) through process of knowledge management (aka KM) for developing self-directed learning ability of undergraduate student, 2) study the quality of WBI model by using KM process for developing self-directed learning ability of undergraduate student and 3) study the result of applying WBI model by using KM process for developing self-directed learning ability of undergraduate student toward learning achievement and ability of self-directed learning. To conduct this research, model research (Richey & Klein, 2007) was implemented through three periods including model development, model validation and model use. The developed model was used with sampling group of 34 students studying in the 2<sup>nd</sup> year of English Program. Their learning achievement was consequently compared with 80% criterion. T-test statistics was used for comparing their self-directed learning ability.

Research findings found as follows:

1. WBI model, using KM process for developing self-directed learning ability of undergraduate student, was developed and found consisting of 9 parts including 1) objectives, 2) course content, 3) internet network, 4) two steps of instruction process; preparing class and teaching, 5) web-based interaction, 6) learner's roles, 7) instructor's roles, 8) supporting factors and 9) measurement and evaluation.
2. Inspection of internal validation conducted by specialists found model appropriateness at "high" level, while the external inspection through trial found that the efficiency of developed model was higher than specified criterion.
3. Result of applying developed model revealed that 90% of students could have scores of learning achievement higher than 80% criterion. The mean of scores of self-directed learning ability after study was found higher than before study with statistical significance at the ".05" level.

**Keywords:** Web-based Instruction, Knowledge Management, Self-directed Learning

## Introduction

Education is the significant foundation for developing country in the age of knowledge based economy and society. As new knowledge are discovered all the time (Office of the National Economic and Social Development Board, 2007), instructors need to change their teaching role from informants to be facilitators. They must promote and support students to involve self-directed learning process with real experiences. Self-directed learning is the process of exploring and discovering knowledge by oneself through authentic thinking and practice step-by-step. It was used for analyzing the importance of what to be learned, to plan, doing, presenting and discussing the various form of summarizing knowledge based on skill and interest (Hiemstra, 1994; Potjana Sabsaman, B.E. 2007.) To manage learning for enhancing student to self-directed learning, instructors should apply web-based teaching technology as instructional media due to the previous instruction model can not respond to all learning needs of learner. Instruction management based on electronic system (aka e-Learning) using internet as the media of communication between learners and instructors is as a building of equality in learning for learners. They can quickly share, learn and report news and form learning society (Bonk and Graham, 2004). Although the study through WBI model will facilitate the instruction management, its capacity is limited by various factors such as time; each learner may has individual free time so they can not learn together, and space; it is recognized as the virtual place which learners may not be able to learn all their best as effective as face to face communication style. This style can enhance the interaction and trustfulness among them as well as the increasing of sharing and learning. Meanwhile, the lacking of face to face interaction may not encourage learner to show their idea or share and learn with other as it should be. Effectiveness of learning is consequently decreased. However, the mentioned limitation can be amended by applying various techniques, procedures and ideas to help presenting course content, as well as providing activities through WBI model. Learners can explore knowledge by these activities including getting more chance of learning and sharing with other. Concept of KM can help solving these problems as it is the concept about creation and acquisition of true and appropriate knowledge, as well as the transferring of knowledge for share and learn with other while the understanding and new ideas is being formed (Garvin. 1994; O'Dell Grayson, 1998).

This research emphasizes on studying for developing WBI model by using KM process of undergraduate students. It aims to form the qualitative WBI model that can be used as one part of instructional activities for effective learning of learners.

## Research questions

1. What does the components of developing effective WBI model by using KM process to develop self-directed learning ability of undergraduate students consist of?
2. How is the quality of WBI model by using KM process to develop self-directed learning ability of undergraduate students?
3. How is learning achievement and self-directed learning ability of undergraduate students who studying through WBI model by using KM process to develop self-directed learning ability?

## **Research objectives**

1. To study WBI model by using KM process to develop self-directed learning ability of undergraduate students
2. To study the quality of WBI model by using KM process to develop self-directed learning ability of undergraduate students
3. To study the result of applying WBI model by using KM process to develop self-directed learning ability of undergraduate students toward learning achievement and ability of self-directed learning

## **Research methodology**

Format of this research was Design and Development Research (Richey & Klein, 2007). It was conducted through three periods as follows:

### **Period 1: Development of WBI model by using KM process to develop self-directed learning ability of undergraduate students**

#### **1. Population and sampling group**

Population for studying the condition and guidance of instructional activities in Faculty of Education, Lampang Rajabhat University for 2008 academic year consisted of 1,272 persons including its 36 lecturers and 1,236 students who studying in the first year to the fifth year.

Sampling group consisted of 293 persons from Faculty of Education, Lampang Rajabhat University including its 9 lecturers and 284 students who studying in the first year to the fifth year of 2008 academic year.

2. Study variables consisted of condition and guidance of preparing instructional activities for lecturers and students at Faculty of Education and also initial model of WBI that was conducted through 6 steps as follows:

Step 1: study the condition and guidance of instructional activities of lecturers and students at Lampang Rajabhat University

Step 2: study related document, journals, textbooks and researches

Step 3: analyze and synthesize data getting from related document, journals, textbooks and researches before applying to specify the model of WBI

Step 4: create the WBI initial model by using KM process to develop self-directed learning ability of undergraduate students

Step 5: propose the WBI initial model by using KM process to develop self-directed learning ability of undergraduate students to advisor for getting suggestion and improvement

Step 6: create evaluation form for WBI initial model and evaluation form for improving WBI model focusing on content and instructional style through website

### **Period 2: Study the quality of WBI model by using KM process to develop self-directed learning ability of undergraduate students**

#### **1. Population**

1.1 Population involved in inspecting the internal validation included 5 specialists for evaluating the appropriateness of instruction initial model and 8 specialists; 5 specialists in course content and 3 specialists in web-based instruction, for evaluating

model to be developed. They all were specifically selected based on the holding of teaching experience in higher education institution at least 3 years. Their researches or academic paper in related fields should be already published.

1.2 Population involved in inspecting the external validation, selected by method of Simple Random Sampling through drawing lots, consisted of 69 persons including 30 third year students of Mathematics Program and 39 second year students of Sciences Program.

## 2. Research procedure

### 2.1 Finding the internal validation

The WBI initial model in the format of diagram and essay was sent to 5 specialists for considering the appropriateness. After that, 5 specialists in course content evaluated the coverage of course content, language and evaluation. The developed program was consequently sent to 3 specialists in WBI for evaluating website design, arranging website format and appropriateness of application. All specialists were specifically selected based on the holding of at least 3 years for teaching experience in higher education institution. Their researches or academic paper in related fields should be already published.

### 2.2 Finding the external validation

WBI model was tried out with 39 second year students of Sciences Program for finding out the effectiveness as following detail:

The first trial was One-to-One Testing. 3 students, selected by method of Simple Random Sampling through drawing lots, were involved studying through developed WBI model. They were then observed and interviewd. Data was brought to improve and solvethe weakness of model.

The second trial was Small Group Testing. 9 students, selected by method of Simple Random Sampling through drawing lots but students in the first trial were not included, were involved studying through WBI model that was improved from One-to-One Testing. The effectiveness of instruction website was found at 87.60 /86.11.

The third one was Field Trial. 27 students, the rest from the first and second trial, were involved studying through WBI model that was improved from Small Group Testing based on teaching plan of developed model of self-directed learning. The effectiveness of instruction website was found at 87.90/86.85.

## Period 3: Study the result of applying WBI model by using KM process to develop self-directed learning ability of undergraduate students

### 1. Population and sampling group

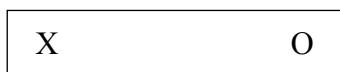
Population for this research was 115 second year students from 3 sections of Educational Technology and Innovation course at Faculty of Education, Lampang Rajabhat University for the second semester of 2010 academic year.

Sampling group consisted of 34 second year students, from undergraduate English Program, who registered Educational Technology and Innovation course for the second semester of 2010 academic year. They all were specifically selected.

## 2. Experimental design

### 2.1 Experimental design concerning measurement of learning achievement

Pre-Experimental Design was used toward One-shot Case Study.



Symbols for experimental design;

X refered to treatment of WBI model by using KM process to develop self-directed learning ability of undergraduate students

O refered to posttest after experimental treatment

### 2.2 Experimental design concerning learners' ability toward self-directed learning

Pre-Experimental Design was used toward One-shot Case Study.



Symbols for experimental design;

O<sub>1</sub> refered to measurement of learners' ability toward self-directed learning before experimental treatment

X refered to treatment of WBI model by using KM process to develop self-directed learning ability of undergraduate students

O<sub>2</sub> refered to measurement of learners' ability toward self-directed learning after experimental treatment

## 3. Research procedure

### 3.1 Preparation before experimentation

Before performing instruction process, readiness preparation on these following matters needed to be concerned: objectives, schedule, procedure, activities, evaluation method, website, lecturing document and instruments for data collection.

### 3.2 The use of developed WBI model for 6 weeks of trial

3.2.1 Teaching preparation through orientation/courses registration was the step of providing students the explanation and suggestion to online registration process of learning website. It also involved leaning activities and the posttest after class. Students were evaluated the ability of self-directed learning before class by practicing the evaluation form.

#### 3.2.2 Instruction steps

3.2.2.1 Students were allowed to join WBI activities by using password to log in the lesson. After reading for understanding any explanations, they processed the learning activities through 5 steps as follows:

**Step 1:** Knowledge Create; Students performed need analysis for emphasizing on what to be learned toward their interest and its value. After that, they had planned self-directed learning.

**Step 2:** Knowledge Acquisition; Students needed to explore, search, manage and process the action for obtaining knowledge by oneself as their plan.

**Step 3:** Knowledge Sharing; Students collected the knowledge they obtained to share, publicize, distribute and learn with friends.

**Step 4:** Knowledge Storage; Students summarized the steps of their learning process and took the knowledge obtaining from study and sharing with friend to be systematically stored.

**Step 5:** Knowledge Utilization; Students applied the knowledge they obtained to create new work in various form based on their interest. They could evaluate work of their own and friends as well.

3.2.2.2 Students practiced the measurement test of learning achievement after class. This multiple choices test consisted of 40 items (4 choices) with difficulties (p) value between 0.27-0.73, discrimination (r) value was found more than ".02" and reliability value at 0.81.

3.2.2.3 Students practiced the evaluation form for self-directed learning ability after finishing activities through web-based instruction. They used the instruments that were developed from online instrument of measuring self-learning readiness of students (Guglielmino, 2005) in the format of 5 level of Rating Scale.

## **Research findings and discussion**

### **Period 1: Development of WBI model by using KM process to develop self-directed learning ability of undergraduate students**

1. A study of condition and guidance of instructional activities for lecturers and students at Faculty of Education, Lampang Rajabhat University found that majority of instructional management style was cooperative learning among learners, while problem-based instructional management for arousing learners to exploring and finding knowledge by oneself was hardly found. The guidance of preparing instructional activities was proposed that lecturers should stimulate students to search the knowledge in which matching to own interest and skill by using effective instructional media.

2. Development of WBI initial model, using KM process for developing self-directed learning ability of undergraduate student, consisted of 9 parts including 1) objectives, 2) course content, 3) internet network, 4) instruction process, 5) web-based interaction, 6) learner's roles, 7) instructor's roles, 8) supporting factors and 9) measurement and evaluation.

### **Period 2: Study the quality of WBI model by using KM process to develop self-directed learning ability of undergraduate students**

1. Result of inspecting internal validity by specialists

1.1 Validity inspection for WBI initial model, conducted by specialists, found the appropriateness at "high" level ( $\bar{X} = 4.50$ ).

1.2 Inspection of content validity and WBI management, conducted by specialists in course content, found the appropriateness of course content at "high" level

( $\bar{X} = 4.33$ ). Specialists in WBI agreed that the appropriateness of WBI was found at “high” level ( $\bar{X} = 4.15$ )

2. Result of inspecting external validity by trying out instrument

2.1 One-to-One testing was conducted by allowing 3 students to studying through developed WBI model. Data was collected by observation and interview before applying to improve and solve the weakness of model. Problems were found with 2 issues as follows:

2.1.1 Students had not yet understood on how to plan self-directed learning. The forming of example of planning self-directed learning was provided for students to study.

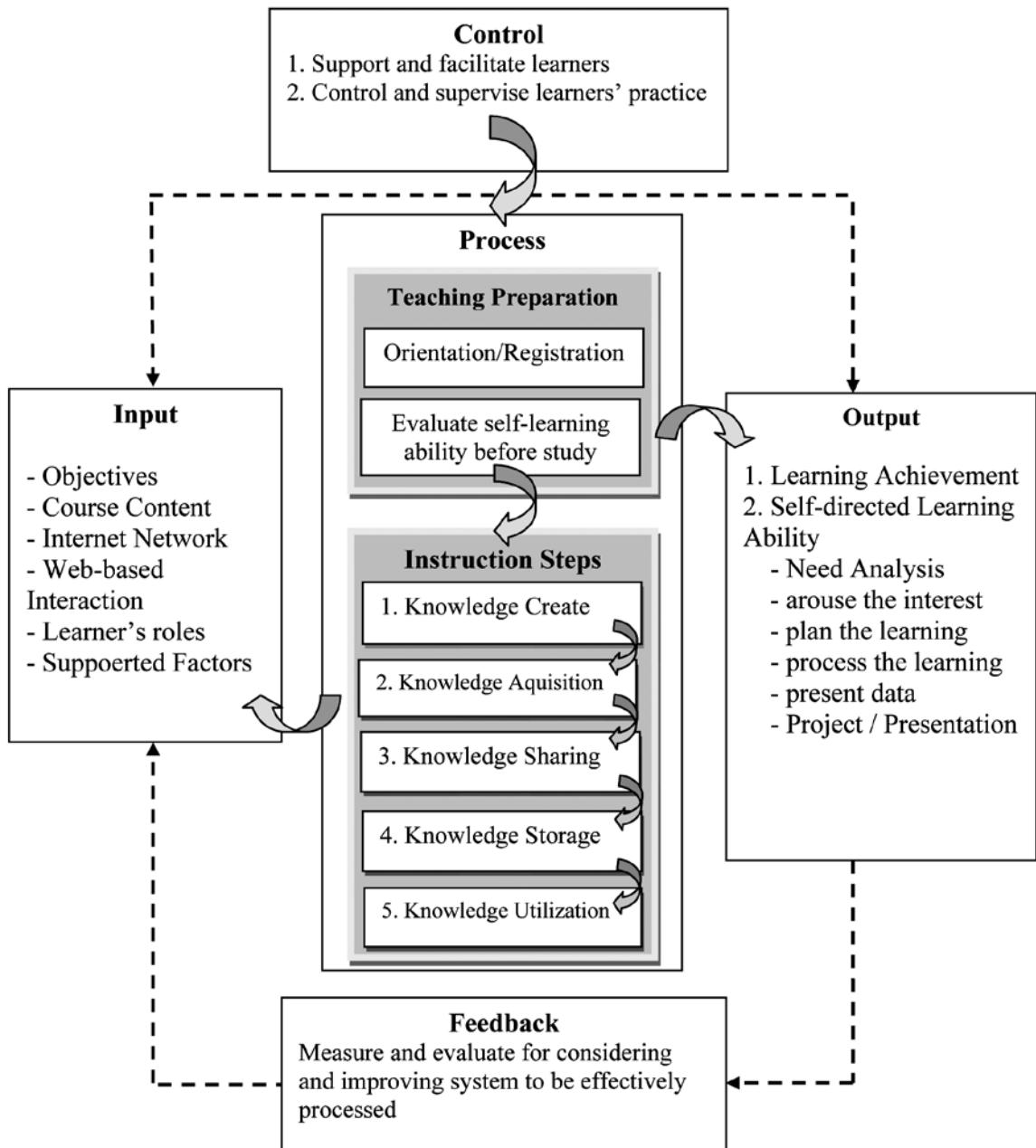
2.1.2 Students took a long time to practice their own need assessment. To improve this matter, length of time was specified in the evaluation system as only one minute for finishing one question.

2.2 Small group testing involved 9 students to studying through WBI model that was improved from One-to-One Testing. It found the effectiveness of instruction website at 87.60 /86.11.

2.3 Field trial, 27 students were involved studying through WBI model that was improved from Small Group Testing. The effectiveness of instruction website was found at 87.90 /86.85.

Based on validity inspection of WBI initial model for both of internal and external validity, it came out with the qualitative WBI model that was developed through concept of System Approach (Bungua Khuanhawet, 2009) which consisted of 9 parts including 1) objectives, 2) course content, 3) internet network, 4) instruction process, 5) web-based interaction, 6) learner’s roles, 7) instructor’s roles, 8) supporting factors and 9) measurement and evaluation as shown in the figure 1 as follows:

## Web-based Instruction model by using knowledge management process to develop self-directed learning ability of undergraduate student



**Figure 1:** Web-based Instruction model by using knowledge management process to develop self-directed learning ability of undergraduate student

Refer to figure 1, it found WBI model by using knowledge management process to develop self-directed learning ability of undergraduate student with 9 parts including;

**1. Objectives:** to develop learning achievement of the course of Educational and Innovation Technology and to develop ability of self-directed learning of undergraduate student

**2. Course content:** Content to be studied was the course of Educational and Innovation Technology which consisted of 7 units including general knowledge of educational innovation, general knowledge of educational technology, theory of learning, educational technology and educational communication, instructional media/media evaluation, computer for education and website for education.

**3. Internet network:** It was the computer server that was installed the instruction website developed through WBI model and connected the internet network to receivers. Learners could involve self-learning activities anytime anywhere.

#### **4. Instruction process**

4.1 Teaching Preparation was the step of supporting learners' readiness for learning content of each chapter and persuaded them to learn. It consisted of orientation/registration and evaluation of self-directed learning ability before study.

4.2 Instruction steps was the process of web-based instruction which allowing students to practice self-learning activites through 5 steps included Knowledge Create, Knowledge Acquisition, Knowledge Sharing, Knowledge Storage and Knowledge Utilization.

**5. Web-based intertation:** These interactions were devided into term of Learner-Content, Learner- Learner, Learner- Instructor and Learner- Interface.

**6. Learner's roles:** Learner was responsible to take part in web-based learning by oneself through steps of instruction process and model. They needed to analyze their needs, plan the study, process the plan and create the project for presentation. During the learning process, learners must discuss, share and learn with friends.

**7. Instructor's role:** The responsibility of instructor was to manage instruction, as well as to control, support, facilitate and supervise the instructional activities. Instructor also provided feedback toward main ideas of learners for each steps and evaluated it after ending of activities. He or she could recommend and suggest the guidance of study as well as being consultant to keep stimulating and motivating students to study based on the interest and needs for practice learning activities that instructor formed.

**8. Supporting factors:** It consisted of teaching website of each course as the virtual classroom on internet and being a virtual place of meeting between learners and instructor so learner could learn by oneself anytime anywhere. Virtual library was the resource providing web-based instruction issues by launching web page to connect the related websites. Learners could search for data though available resources on the website. Web-based supporting service was the design of website for communication, distribution, learning and sharing and presenting information or summary getting from knowledge.

**9. Measurement and evaluation** were conducted for evaluating the result of applying WBI model using 40 items of measuring test for learning achievement after model application. Evaluation form was also used with students before and after model application for evaluating ability of self-directed learning.

#### **Period 3: study the result of applying WBI model by using KM process to develop self-directed learning ability of undergraduate students**

1. After comparing learning achievement of students who involved studying through developed instruction model with 80% criterion (at least 80% of all students could

have more than 80% of score), it found that students could have the mean of learning achievement score at 35.05 or 87.62%. Comparing to the criterion, it found that 90% of students could have score higher than 80% criterion.

2. To compare ability of self-directed learning of students who involved studying through developed instruction model, 34 students of sampling group were allowed to practice evaluation form of self-directed learning ability before and after study. It consequently found that they could have the mean of scores of self-directed learning ability after study higher than before study with statistical significance at the “.05” level.

## **Discussion**

The developed WBI model by using KM process for developing self-directed learning ability of undergraduate student came out with appropriate quality. It could improve learning achievement and develop self-directed learning ability of students. As students could learn through website by oneself, they consequently involved in learning process they formed as well as the motivation for study with ambition they faced. Students could not only study anywhere anytime but also learn and share with friends which affected to their learning for being better. It found the consistency with Knowles (1975) and Hiemstra & Burns (1997) who stated that teaching through generating learning process was the starting of understanding self-directed learning. Those who searched for knowledge by oneself while studying could have motivation for study with ambition. They could be better in learning and remembering what they had learned. Their ability of applying knowledge was also better than those who only obtained knowledge by study with instructor.

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