The Development of Blended Learning Management Model in Developing Information Literacy Skills (BL-ILS Model)

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***Abstract*—The objectives of this research were to develop an efficient blended learning management model in developing information literacy skills for undergraduate students, and to study the outcome of the development information literacy skills of undergraduate students taught by the BL-ILS model. The research was conducted by synthesis and model development which was *investigated* by experts. The principle of model was blended between face to face and online learning by focusing on self directed learning. The instructor acted as a guide by using learning management strategies in developing information literacy skills for 5 steps. Using model was to study outcome in developing of information literacy skills with the first simple group and checking model validation was used with the second sample group. The results were found that the students' competency in literacy skills after learning with the BL-ILS model was higher and a significant difference of pretest and posttest average scores (P<0.01). The efficiency of the BL-ILS model was at "Very Good" level and appropriate for learning management in other higher education courses. It also could be used as the core of learning management in different sciences because it enhances self-directed learning and allows students to learn independently and efficiently.**

***Index Items*—Blended learning, information literacy skills, learning management strategies.**

I. Introduction

Nowadays knowledge-based society is brimming with information. Consequently, people must know a significant amount of information and learn continuously to keep pace up with new developments. Individuals need to learn to perceive information and news appropriately and correctly. A person who possesses information literacy can live in the information society and the 21st century [1]. The study of Information Technology and Communication Project 2007 of the Nation Statistical Office, Ministry of Information Technology found that Thai society used more information technology and the Internet but was unable to use the information efficiently [2]. In addition, Thai society could not access the knowledge-based society as people lacked information to access skills and utilize information efficiently. They lacked the ability to modify information skills to become knowledgeable and also lacked thinking and reasoning skills to construct the body of knowledge independently [3]. Information literacy was everyone's major learning objective to help access information from every corner of the world, and use the information efficiently to promote freedom in learning. So, development of information literacy process skills for students to use as the core of learning in different sciences would power the knowledge-based society and be the main factor to change both Thai and the world society [1].

Learning management process to support information literacy skills by using information technology is one way to develop the ideas and people's potential in having reasons, systems and orders, communication, information selection and designating the strategies in solving the life problems of everyone and is also used as a tool to promote studying skills in other sciences [4]. Besides this blended learning activities are managed in accordance with online and face-to-face learning, opportunities and facilities will happen to the students in many ways. For example, the students can communicate and react with the teacher and classmate in the classroom and online. They can learn from learning materials presented in the classroom and online. They can work in groups through technology in the virtual classroom [5]. When students and teachers are simultaneously developed the ability in technology [6] more students are motivated in attending class with the feeling of learning community more than other learning models [7]. The students are also developed to understand the profound body of knowledge [8]. Good blended learning management will motivate and increase the ability of finding the learning processes by oneself, so the students are self-confident and succeed in learning [9]. They can access the information and efficiency of learning [10].

II. The Purpose of the Research

The objectives of this research were:

1) To develop an efficient blended learning management model in developing information literacy skills for undergraduate students.
2) To study the outcome of the development information literacy skills of undergraduate students taught by the BL-ILS model.

III. Research Methodology

There are three phases of this study:

A. Model Development

In the development stage, the researcher studied basic information and problems in instructional management of undergraduate students as well as related literature Nuanphan Chaiyama [11]. The researcher adjusted current approaches

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with of enhancement information literacy from Mike Eisenberg &Bob Berkowitz [12] and other research Achanya Rattana-ubon, *et al*. [13]. The model was investigated by five experts, and their recommendation was considered. The blended learning management plan to develop information literacy skills and online lesson on Learning Management System (LMS) was constructed, as well as the instrument for data collection. The model was adapted to be more efficient in the pilot experiment. The instrument was used for collecting data to be experimented from students enrolling in the course ST 071001: Information Technology for Learning, 30 students of the Institute of Physical Education Phetchabun enrolling in the second semester of 2012 academic year were separated from the sampling group to study suitability and possibility for used learning management. The researcher collected data, and the findings from the pilot experiment were analyzed by using the mean and standard deviation. Content analysis was administered to reach conclusions and improve the learning management model. The instrument for learning management was complete before using.

B. Model Use

In this stage, the researcher performed a One Group Pretest Posttest Design as an experimental study. The samples were 30 students of Institute of Physical Education Phetchabun enrolling in the course ST 071001: Information Technology for Learning, during the second semester of 2012 academic year. They were selected by purposive sampling based on step by step implementation as follows:

1) *Preparation*: The researcher organized orientation, grouped the students, assigned the students who enrolled, and trained them in the technique of using the information technology system. The students responded to the Information Literacy Skills Test before studying. The instructor investigated the Information Literacy Skills Test and told students to gauge their own skills level as the guidelines for determining the goal of further study.
2) *Teaching: According to the Learning Model*: The researcher implemented teaching based on the blended learning activity model and planned to develop the specified information literacy skills.
3) *Data Collection during Learning Management*: The researcher collected data from the outcomes of learning management by prepared instruments. Data were analyzed, including the incidences during learning management, discussions, and sharing among group members as well as learning achievement (work pieces) stored in the Learning Management System (LMS).
4) *Measurement of Posttest Information Literacy Skills*: After implementing the experiment with each learning activity management plan, the researcher tested the students' information literacy skills by using the Information Literacy Skills Test, and investigated and provided feedback to the students.

Data were reported as the means and standard deviations. Data were analyzed by comparing with the criterion, and interpreted based on specified meaning to conclude students' level of information literacy for each skill. The content analysis was conducted from data by interviewing students and seeking their opinions on learning development developed by the researcher. The scores from responses to the Information Literacy Skills Test pretest and posttest were compared using the t-test dependent.

C. Model Validation

In stage of model validation has brought the learning management model in the course KS 31001: Innovation and Educational Information Technology by writing 6 lesson plans and developed them as the online lesson using the same research equipment with the research in phase 2. The researcher performed a One Group Pretest Posttest Design as an experimental study. The sample group from purposive sampling was 35 students of Institute of Physical Education Phetchabun, first semester of the 2013 academic year.

IV. Research Instruments

These were used as the measurement tools and other instruments in the research:

A. The Instrument Used in the Experiment

1) The blended learning management plan in *developing information literacy skills*
2) The website of online lesson *developed by the researcher was stored in Learning Management System (LMS).*

B. The Instrument Used for Data Collection

1) The Information Literacy Skills Test developed by the researcher by adapting the Information Literacy Skills Test of Kochaporn Sriphan [14] based on the approach of Association of College and Research Libraries ACRL [15] for five standards as multiple choice question, 50 items, the Cronbach's alpha score of 0.89.
2) The Learning Evaluation Inventory (Work Piece), used to evaluate students' learning performance was established in each step of learning management for evaluating students' competency in each information literacy skill.
3) The Students' Structured Interview, used for asking students' opinion on the learning activity. The issues were classified into issues relating to students, instructors, instructional media, and appropriateness of learning activity, activity characteristic, and duration of learning activity management, and conclusions and evaluation of learning.

V. Research Results

A. Result of Model Development

The blended learning management model in developing information literacy skills for undergraduate students (see Fig. 1), developed by the researcher, consisted of four components (see Table I):

1) The principle of learning model
2) The objective of learning model
3) The learning management process
4) The measurement and evaluation of the learning model

There were two phases of learning management process:

1) The phase of preparation
2) The phase of learning management strategies in

developing information literacy skills including:

- Determination of task for study.
- Determination of strategies for searching information.
- Search and collection of information.
- Analysis, synthesis, and organization of information
- Evaluation and presentation of information

The efficiency of the learning management model, developed by the researcher reached a "Very Good" level ($\overline{X}$ = 4.65, S.D. = 0.48), and the results of the pilot experiment the BL-ILS model was found that learning management model could be used continually (see Table II).

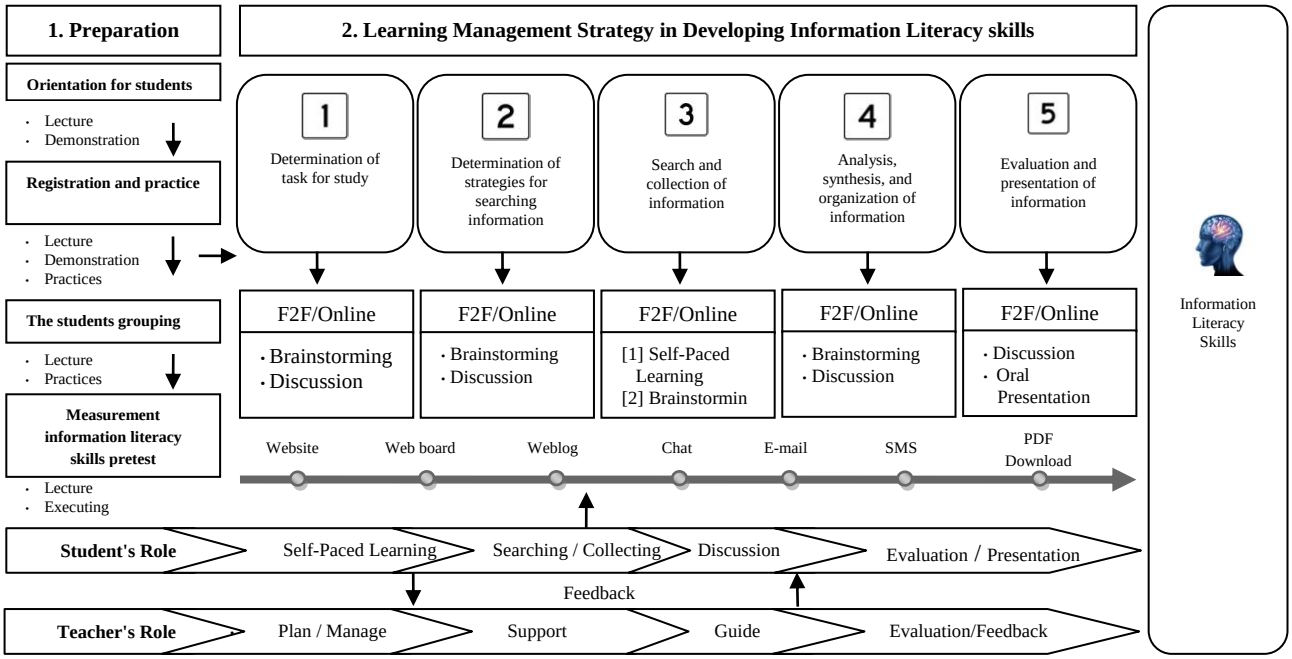

Fig. 1. The blended learning management model in developing information literacy skills (BL-ILS model).

TABLE I: COMPONENTS OF THE BLENDED LEARNING MANAGEMENT MODEL IN DEVELOPING INFORMATION LITERACY SKILLS

Principle of Learning Model	*Objective of Learning Model*	*Learning Management Process*	*Measurement and Evaluation*
Blended Learning Management (face-to-face/Online)	Determines the nature and extent of the information needed	Phase 1: Preparation	The Authentic Measurement and Evaluation
Strategy to Develop Information Literacy Skills	Accesses needed information effectively and efficiently	Phase 2: Learning Management Strategies in Developing Information Literacy Skills	Measurement of Information Literacy Skills after Studying
Media/Supportive Resource of Learning	Evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system		
Students' role	Individually or as a member of a group, uses information effectively to accomplish a specific purpose		
Instructors' role	Understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally		

TABLE II: THE EFFICENCY OF THE BL-ILS MODEL WAS INVESTIGATED BY THE EXPERTS

Detail of Evaluation	**Result of efficiency**		
	$\overline{X}$	**S.D.**	**Efficiency level**
The principles and concept to develop the blended Learning management model in developing information literacy skills	4.60	0.54	Very Good
The objective of learning management model	4.60	0.54	Very Good
Media/Supportive Resource of Learning	4.60	0.54	Very Good
Learning Management Process	4.60	0.54	Very Good
Learning management strategies in developing information literacy skills	4.80	0.44	Very Good
1) Determination of task for study.	4.60	0.54	Very Good
2) Determination of strategies for searching information.	4.80	0.44	Very Good
3) Search and collection of information	4.60	0.54	Very Good
4) The analysis, synthesis, and organization of information	4.60	0.54	Very Good
5) The evaluation and presentation of information	4.80	0.44	Very Good
Measurement and Evaluation of Learning	4.60	0.54	Very Good
The possibility to utilize the blended learning management model in developing information literacy skills to use in learning management	4.60	0.54	Very Good
Average score	**4.65**	**0.48**	**Very Good**

TABLE III: THE STUDENTS' AVERAGE SCORE OF INFORMATION LITERACY SKILLS TAUGHT BY THE BL-ILS MODEL

Information Literacy Skills	Full Score	*N*=30 Pretest $\bar{x}_1$	Pretest S.D.$_1$	Posttest $\bar{x}_2$	Posttest S.D.$_2$	*t*	*p*
The information literate student determines the nature and extent of the information needed.	9	5.03	0.85	6.03	0.92	-7.37	.000
The information literate student accesses needed information effectively and efficiently.	11	6.43	0.89	7.43	0.89	-6.59	.000
The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.	12	7.50	0.86	8.40	0.96	-5.57	.000
The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.	10	5.73	0.74	6.70	0.79	-7.37	.000
The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.	8	4.60	0.62	5.60	0.77	-8.51	.000
Average score	**50**	**29.30**	**3.05**	**34.17**	**3.59**	**-8.03**	**.000**

TABLE IV: THE STUDENTS' COMPETENCY IN CEACH IN FORMATION LITERACY SKILLS TAUGHT BY THE BL-ILS MODEL

Information Literacy Skills	Result of Competency $\bar{X}$	S.D.	Competency level
The information literate student determines the nature and extent of the information needed.	3.26	0.45	Good
The information literate student accesses needed information effectively and efficiently.	3.74	0.45	Very Good
The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.	3.26	0.45	Good
The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.	3.16	0.37	Good
The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.	3.11	0.32	Good
Average score	**3.30**	**0.60**	**Good**

TABLE V: THE STUDENTS' AVERAGE SCORE OF INFORMATION LITERACY SKILLS TAUGHT BY THE BL-ILS MODEL

Information Literacy Skills	Full Score	*N*=35 Pretest $\bar{x}_1$	Pretest S.D.$_1$	Posttest $\bar{x}_2$	Posttest S.D.$_2$	*t*	*p*
The information literate student determines the nature and extent of the information needed.	9	4.94	0.83	5.89	0.96	-7.69	.000
The information literate student accesses needed information effectively and efficiently.	11	6.51	0.88	7.45	0.85	-6.95	.000
The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.	12	7.53	0.85	8.43	0.91	-6.00	.000
The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.	10	5.69	0.71	6.60	0.81	-7.70	.000
The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.	8	4.66	0.68	5.57	0.73	-8.20	.000
Average score	**50**	**29.37**	**2.99**	**33.94**	**3.48**	**-8.35**	**.000**

B. Result of Model Use

1) The outcome of development information literacy skills of students taught by the bl-ils model

The experiment studied the blended learning management model in developing information literacy skills for undergraduate students, with the samples of 30 students who enrolled the course ST 071001: Information Technology for Learning, during the second semester of 2012 academic year. The research findings revealed that the samples taught by the blended learning management model in developing information literacy skills had posttest scores of information literacy skills at a higher level than the pretest score at 0.01 level of significance (see Table III). In addition, they had

average scores from each competency skill in information literacy at the "Good" level (see Table IV). Analysis of the qualitative data found that the students were happy while participating in the learning activities. They had more opportunity to train for systematic thinking. They obtained learning, and were able to construct a body of knowledge by themselves through participation in learning activities. They had the opportunity to share and compare their opinions with their friends and classmates. They discussed with their friends the different issues of knowledge. As a result, they developed their group working skill, and had more self-confidence in presentation or discussion of performance. They can meet recommended guidelines for applying knowledge in other situations, and practice their skills using the information technology and online learning through Internet network system.

TABLE VI: THE STUDENTS' COMPETENCY IN CEACH IN FORMATION LITERACY SKILLS TAUGHT BY THE BL-ILS MODEL

Information Literacy Skills	Result of Competency		
	$\overline{X}$	S.D.	Competency level
The information literate student determines the nature and extent of the information needed.	3.42	0.50	Good
The information literate student accesses needed information effectively and efficiently.	3.67	0.47	Very Good
The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.	3.44	0.50	Good
The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.	3.36	0.48	Good
The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.	3.47	0.56	Good
Average score	3.47	0.50	**Good**

2) The studying results of students' ideas taught by the bl-ils model

From observing and interviewing the students' ideas taught by learning management, students had holistic satisfaction for the learning management model, most of them liked learning activities online because they learnt new learning techniques and methods from using the internet for communicating and presetting the information. They thought the learning management model with strategies to promote 5 stages of learning the information literacy skills had appropriateness and encouraged the information literacy skills. The students were happy and fun during learning activities. They had an opportunity to practice systematical thinking skills, learnt and built the body of knowledge by themselves from attending the learning activities. They could exchange their ideas and compare them with their friends inside the group and the classmates about the learning points. They also developed working skills of their group and had good human relationship with their classmates. They were confident in debating and presenting their work and gave the guidelines to be applied in other situations. They wanted the learning activities like this in other courses

C. Result of Model Validation

The results of investigating the model validation of BL-ILS model the researcher developed to evaluate the effectiveness of the learning management model in the course KS 31001: Innovation and Educational Information Technology. The results and discussions were as follows:

Students' scores of the information literacy skills of the posttest in the learning management model the researcher developed were higher than the pretest in all standards scores at 0.01 level of significance (see Table V). In addition, they had average scores from each competency skill in information literacy at the "Good" level (see Table VI) indicating that the learning management model the researcher developed had good quality and developed the information literacy skills of the students.

VI. DISCUSSION

1) The students taught by the blended learning management model to develop the information literacy skills, obtained higher level posttest scores of information than pretest scores at 0.01 level of significance. Furthermore, they had an average score of "Good" in each of information literacy skill, as the specified hypothesis. The researcher applied the approach of blended learning management to develop higher order thinking skills of Nuanphan Chaiyama [11] with the approach of information literacy enhancement from The Big 6 Skills model developed by Mike Eisenberg & Bob Berkowitz [12], and process of information literacy enhancement for Thai Society developed by Achanya Rattana-ubon, *et al*. [13]. This was to be synthesized into a process of learning management as well as strategies for developing the information literacy skills in undergraduate students. There was continuity in each step of learning from the two phases: Phase 1: the preparation (face-to-face activity was focused on), Phase 2: learning management strategies to develop information literacy skills. (face-to-face/ online activity was organized) emphasizing that students practice learning through group process and the instructors played their role as facilitators in guiding the learning, including these five steps: 1) determination of task for study, 2) determination of strategies for searching information, 3) search and collection of information, 4) analysis, synthesis, and organization of information, and 5) evaluation and presentation of information. The

processes of learning management promoted the students to develop the information literacy skills through the systematic thinking skill and built creative work and the body of knowledge by oneself. The students could also bring the stages and learning approaches to apply as the core issues for learning in other sciences efficiently and effectively in accordance with the research of Pitrik & Mallich [9] in that the blended learning developed the ability of learning participation and found the learning process by themselves, students were self-confident and succeeded in learning. The teachers reacted well with the students in line with the Bonk & Graham [10] and Johnson, McHugo & Hall [8] in that the blended learning benefited the students in learning efficiency and accessing the information which made the students understand the profound body of knowledge and build the new body of knowledge on their own.

2) Students learning taught by the BL-ILS model had satisfaction in learning with fun and wanted other courses to be managed in this manner in line with the research of McVey [6] Nuanphan Chaiyama [11], Niramon Rodniam [16], Panita Wannapiroon [17], in that the blended learning built satisfaction to the students in their learning in the same way with the research of Pitrik & Mallich [9] saying that the blended learning helped the students want to learn more. They were eager during the learning activities. They had an opportunity in practicing the systematic thinking skill and built the body of knowledge on their own from participation in learning activities. They could exchange the ideas and compare their opinions with their friends in group as well as their classmates in the points of knowledge developed through group work skills and good human relationship with their classmates in accordance with the research of Rovai & Jordan [7] in that blended learning made the students eager in learning, motivate and increase class attendance of the students. It could build the feeling of learning communities more than other learning models, the students were confident in debating and presenting their work and gave the guidelines to apply knowledge in other situations. The students practiced using the information technology and online learning through the internet network in line with the research of McVey [6] in that blended learning built flexibility and increased the value of learning from using technology and internet in presenting the learning issues while students and teachers were developed in using technology which made a new form of communication with great potential in the learning management.

3) The results of finding the model validation of the BL-ILS model researcher developed by using learning management model in the course KS 31001: Innovation and Educational Information Technology. From the comparative results of average scores of information literacy skills from pretest and posttest of the sample group, it was found the students taught by the BL-ILS model had higher scores of developing the information literacy skills of posttest than pretest scores at 0.01 level of significance and they had an average score of "Good" in each of information literacy skill. The results were summarized that the learning management model which the researcher developed had efficiency and appropriateness for learning management in other courses to develop the information literacy skills for undergraduate students in line with the idea of Chutima Sacchanand [1] saying that developing the skill of the information literacy process to the students helped the students use it as the learning core of other sciences.

VII. Conclusion

In summary, this research supported the outcome of development and application of a learning management model by writing the learning management plans for developing information literacy skills in information technology for teaching the undergraduate students. It is also appropriate to be applied in learning management in other courses. Our findings emphasized that the instructors would implement it to analyze the learning content as well as prepare learning media. Studying the relationship between developments of information literacy skills, learning achievement, competency in information communication, technology and thinking process could be a good direction for future research.

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