The Development Blended Learning Model Through the Use of Active Learning to Enhance Information Literacy of Undergraduate Students

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Abstract

The objective of this research was to develop a blended learning model through the use of active learning to enhance information literacy of undergraduate students. The samples size was 62 undergraduate students that were selected using a cluster random sampling method. Those were been divided into two groups: 30 students in the experimental group and 32 students in the control group. Research instruments employed were as follows: 1) A needs assessment questionnaires, 2) A Questionnaire on Student Learning Behaviors, 3) A teaching model, 4) Lesson plans, 5) An information literacy assessment, and 6) An assessment to validify the teaching model. Data obtained were analyzed using mean, standard deviation, t-test independent, and effect size statistics.

The findings revealed that the model consisted of five components including learners, facilitators, various teaching methods, digital learning tools, and evaluation. The activity-based process included six steps comprising: 1) definition, 2) information-seeking strategies, 3) location and access, 4) use of information, 5) synthesis, and 6) evaluation. After experimenting with the model, the results indicated that learners who used the blended learning model through the use of active learning demonstrated significantly higher information literacy compared to those in the traditional learning group, with a statistical significance level of .05. Its effect size is 6.59, which is considered a large effect size. Additionally, the validity of the model was verified by experts who agreed that it was suitable for classroom use.

Keywords: Blended Learning, Active Learning, Information Literacy

Introduction

The advancement of Information and Communication Technology (ICT) as well as accessibility to news and information are constantly developing. Information is being produced at an ever-increasing rate, leading to a phenomenon known as information explosion (Bawden & Robinson, 2020). Therefore, the quality of current information poses a challenge for users who require basic information literacy, as well as the abilities to search, organize, categorize, assess, and use the information to make decisions and solve problems (UNESCO, 2013). Information literacy is a vital capability for learners in the 21st century, as the development of countries in this era is driven by news, information, and information technology. Additionally, information literacy plays a significant role in education and daily life. Regarding education, information literacy is a foundational component of every level of education, especially in higher education.

Higher education aims to develop human resources to produce graduates with advanced skills that meet the needs of society (Swapna & Biradar, 2017). Graduates should be knowledgeable and capable of applying their knowledge to perform their tasks effectively. Information literacy is a key factor in fostering lifelong learning skills, which is one of the missions of higher education. This will result in intelligence, logical thinking, and critical thinking among learners. It will also help learners design their learning process, which is an essential element for career advancement (Brown & Malenfant, 2016).

Education in the age of disruptive technologies enables learners to learn at any time and from any location. As such, it is necessary to develop engaging curricula that can effectively respond to learners' learning process

such as a blended learning curriculum that combines online learning with face-to-face meetings (Almarzooq et al., 2020). Lessons in the classroom should engage students and encourage them to develop their bodies of knowledge. One example of such lessons is active learning, which involves interaction between instructors and students, as well as among the students themselves. Active learning focuses on practicality and knowledge exchange, allowing students to develop bodies of knowledge on their own and apply what has been learned in real-life situations. In this type of learning, instructors only act as facilitators who provide suggestions and encourage students to learn by themselves (Hartikainen et al., 2019; Wan & Niu, 2020; Børte et al., 2020). This approach fosters knowledge-seeking, self-learning, and information literacy (Walsh, 2020; Anderson, 2021).

After studying documents and research as well as interviewing instructors in higher education, it was found that the majority of students collect information too easily, particularly through the use of search tools, and often believe such information without exercising careful judgement. They prioritize convenience over the quality of information, which is why search engines like Google are the most commonly used tools, resulting in a lack of knowledge and skills in searching information through Online Public Access Catalogs (OPAC) and other sources (Banyen et al., 2016; Buzzetto-Hollywood et al., 2018; White, 2019). This obstacle hinders learning in higher education. Furthermore, the lessons for higher education in Thailand are mainly taught through lectures, leaving learners short of the essential skills needed for the 21st century. The lessons are not practical and focus more on quantity rather than quality. Additionally, class sizes are massive, which inhibits interaction between instructors and learners (Pradubthong et al., 2018; Na et al., 2020).

The researcher realizes the importance of fostering information literacy that focuses on instructors and learners while supporting learning both inside and outside of the classroom. It leads to the idea of integrating information technologies into lessons. Various learning methods and meaningful learning can encourage effective learning. Accordingly, the researcher would like to develop blended learning model through the use of active learning to enhance the information literacy of undergraduate students and study the effectiveness of the learning model. The study will serve as a guideline for developing necessary skills in the 21st century among students.

Research Objectives

To develop and study the results of using blended learning model through the use of active learning to enhance information literacy of undergraduate students.

Research Hypothesis

Learners with blended learning possess more information literacy than ones with typical learning.

Literature Rereview

Concept of Blended Learning Model Through the Use of Active Learning

Education in the age of disruptive technologies can break free from the confines of the four-cornered classroom. Students can learn at any time and from anywhere they want. To provide alternatives to learners and effectively respond to their learning, educational innovation has been developed by integrating two primary concepts including active learning and blended learning, which is the integration of technologies and teaching techniques that are widely recognized. Blended learning combines various learning methods, including distance learning through online

platforms and face-to-face learning. This approach provides learners with flexibility. Active learning is a learning process that employs several methods. Students will be engaged in a process that emphasizes learning through practices and the exchange of opinions in order to encourage them to develop their own bodies of knowledge and analytical thinking process that they can apply in real-life situations. Instructors serve as facilitators, offering advice and encouraging students to learn by themselves. This kind of learning fosters knowledge-seeking, self-learning, and information literacy among students. (Fongjangwang & Kongmanus, 2017; Alammary, 2019; Ginestie & Impedovo, 2020; Maxwell, 2020; Siripongdee et al., 2020; Karo, 2021)

Concept of the Big6 Process

The Big6 model empowers individuals to effectively navigate the information landscape and develop critical information literacy skills. It has been widely adopted and applied in educational settings to enhance students' abilities to find, evaluate, and use information in various contexts. The Big Six of Eisenberg and Berkowitz (2011), as listed below: 1) Task Definition, 2) Information Seeking Strategies, 3) Location and Access, 4) Use of Information, 5) Synthesis, and 6) Evaluation. The Big6 model enables individuals to become more adept at navigating the vast amounts of information available to them and make informed decisions based on their findings. These skills are crucial in today's digital age, where information is easily accessible but can be overwhelming and challenging to manage (Eisenberg & Berkowitz, 2011; Baji et al., 2018).

Concept of Information Literacy

Information literacy is essential for students in higher education to engage in self-learning and apply their knowledge in real-life situations. It boosts the critical thinking process. The information literacy skills of students at the tertiary education level are synthesized from the information literacy standards of various countries, including UNESCO, ALA, and ANZIIL. Information literate individuals should be able to identify and access information, evaluate and manage information, apply information, communicate using information, and have ethical behavior in using information. One way to enhance information literacy is to integrate information technologies into the learning process so that students can skillfully, resulting in the development of bodies of knowledge for their careers and lifelong learning (Eisenberg & Berkowitz, 2011; Baji et al., 2018; Kozikoglu & Onur, 2019; Tejedor et al., 2020).

Methodology

Population and Sample

Population of this study were 260 undergraduate students from the Faculty of Education, Nakhon Ratchasima Rajabhat University, enrolled in the Educational Technology course. The course was divided into 8 classes. The participants in this study were selected using a cluster random sampling method. There were 30 students in the experimental group and 32 students in the controlled group, with the total number of 62 students.

Instruments

The research instruments were developed by the researcher and were tested as follows:

- A needs assessment questionnaires for instructors on conditions, problems, and necessities they found: the quality of the survey was assessed with the Item Objective Congruence (IOC) assessment conducted with five experts. The obtained IOC index ranged from 0.60-1.00.

- A Questionnaire on Student Learning Behaviors: the quality of the survey was assessed with the Item Objective Congruence (IOC) assessment conducted with five experts. The obtained IOC index ranged from 0.60-1.00.

- A teaching model: it was assessed by five experts and achieved the highest quality level ($\bar{x}$ = 4.67, SD = 0.45). The criteria for each level were as follows: 4.50-5.00 (highest), 3.50-4.49 (high), 2.50-3.49 (average), 1.50-2.49 (low), and 1.00-1.49 (lowest).

- Lesson plans: the steps were based on the model. The plans were assessed by five experts and achieved high quality level ($\bar{x}$ = 4.40, SD = 0.64). The criteria for each level were as follows: 4.50-5.00 (highest), 3.50-4.49 (high), 2.50-3.49 (average), 1.50-2.49 (low), and 1.00-1.49 (lowest).

- An information literacy assessment: there were 30 items, each with four choices. The Item Objective Congruence (IOC) was evaluated by five experts, resulting in congruence indices between 0.60-1.00. Then, the reliability was assessed, achieving a Cronbach's Alpha coefficient of 0.83.

- An assessment to validify the teaching model: the quality of the survey was assessed with the Item Objective Congruence (IOC) assessment conducted with five experts. The congruence index for each question is over 0.5.

Methods

The development of the blended learning model through the use of active learning to enhance the information literacy of undergraduate students was conducted through a four-step process as follows.

Step 1: Studying the conditions for teaching and learning

1. Studied the conditions for teaching and learning, relevant documents and research, blended learning, active learning, information literacy, and the development of teaching and learning models.

2. Conducted a survey among instructors regarding the current learning environment and the needs of using teaching model. Finally, analyze the findings derived from the students' opinions by means of the Modified Priority Needs Index (PNI Modified).

3. Conducted a survey among students regarding the current teaching and learning behaviors and the use of information technology.

Step 2: Development of a model

1. The results in the first step were used to build a teaching model.

2. Activity plans were created based on the teaching model and the assessment of lesson plans and then evaluated for quality before revising them as suggested by the experts.

3. The experts were selected from a pool of higher-education instructors who had developed teaching and learning models and had at least 5 years of working experience. The model was then revised according to the experts' suggestions.

Step 3: Experimenting with the model

1. The procedures in the model were introduced, as well as the roles of instructors and students.

2. Started the teaching based on the learning process of the model, with six activity plans of 180 minutes each. The experiment lasted six weeks, during which the researcher observed the students' behaviors.

3. After completing the teaching as planned, the researcher conducted an assessment of information literacy on both the experimental and control groups. In the end, the findings of the assessment were used for data analysis using SPSS for windows programming version 28.

Step 4: Validating the model

1. The results of the model and the findings from the sample were presented in document form.

2. Five experts were asked to validate the model. The experts were selected from a pool of higher-education professors who had developed teaching and learning models and had at least 10 years of working experience.

3. The model was revised as suggested by the experts.

Results

1. The results of the development of a blended learning model through the use of active learning to enhance the information literacy of undergraduate students.

1.1 The result of surveying for the viewpoints regarding the current conditions and necessities of using teaching model, it is found that instructors' first necessity among instructors was to let students learn through practice. The second was to use activities and various methods to trigger students' interests, and the third was to use digital technology to enhance learning.

For the results indicated that students rarely learned through practical means, teaching methods lacked diversity, there were no information systems or communication channels, and there was a lack of assessment for learning performance.

1.2 The results of the development of a blended learning model through the use of active learning to enhance the information literacy of undergraduate students consisted of five components and six steps of learning. The assessment of the class activities based on the model yielded overall results at the highest level ($\bar{x}$ = 4.67, SD = 0.45), as shown in Figure 1.

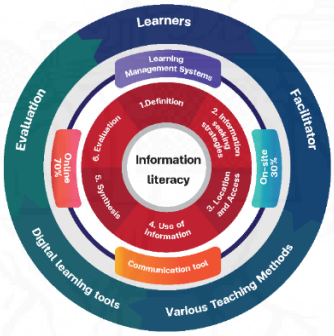

Figure 1 Blended Learning Model Through the Use of Active Learning.

The blended learning model through the use of active learning to enhance the information literacy of undergraduate students consisted of five components as follows.

Table 1 Components and Definitions

Main Components	Definitions
Learners	Learners play a role in generating bodies of knowledge by themselves through activities in both online and on-site classes. They can skillfully use community tools and technology.
Facilitators	Instructors play a role in holding in-class and extracurricular activities. They act as facilitators who help learners learn while providing advice, encouraging learners to think, and preparing appropriate learning resources. They are capable of using learning management systems and technology for diverse learning, as well as being able to use communication tools.
Digital Learning Tools	- A learning management system (LMS) is a tool that helps learners access content, as well as manage, control, back up, and provide support for data; record learners' statistics; and assess their performance. - Learning technology is a tool that assists learners with their interaction, opinion expression, and brainstorming. - Communication-facilitated technology is a tool used for communication between instructors and learners and among learners. The discussions are both synchronous and asynchronous.

Table 1 (Cont.)

Main Components	Definitions
Various Teaching Methods	Various teaching methods engage learners and allow them to practice and generate bodies of knowledge on their own. These methods integrate information literacy in individual and group activities, where practical activities allow learners to learn through practice in order to help learners build a consistent thinking process by searching for information from reliable sources and referring to the sources as an ethical individual should do.
Evaluation	The evaluation is performed using various methods based on authentic assessment and summative evaluation. It is conducted both during and after the study process.

The steps for the blended learning model through the use of active learning to enhance the information literacy of undergraduate students are based on the Big Six of Eisenberg and Berkowitz (2011), as listed below.

Step 1: Task definition aims to identify the problems or scopes of the required information and identify the purposes in order to search for the information in the next step.

Step 2: Information-seeking strategies are used to identify the sources of the required information and assess the suitability of the sources as well as the identify problems so that the acquired information will meet the needs.

Step 3: Location and access aim to identify the location of the information and search for the information from the identified sources.

Step 4: Use of information is used to read and look into the required information before selecting the relevant information.

Step 5: Synthesis involves integrating the information into a cohesive solution or answer to the problem or question.

Step 6: Evaluation means assessing the finished work and the process used to solve information-related problems.

2. The results of applying the blended learning model through the use of active learning to enhance the information literacy of undergraduate students.

2.1 A comparison of the information literacy levels of learners who learned through the Blended learning model through the use of active learning and those who learned through a traditional method is shown in Table 2.

Table 2 A Comparison of the Average Scores of Information Literacy of the Experimental Group Who Learned by Using the Blended Learning Model Through the Use of Active Learning and the Control Group Who Learned Through a Traditional Method

Score	Control Group		Experimental Group		Mean Sifference (95% CI)		p-value	Effect Sizes (d)* (95% CI)	
	M	SD	M	SD					
	17.22	1.46	29.56	2.05	12.34	(12.08-12.60)	< 0.001**	6.59	(4.77-8.43)

Abbreviations: Mean (M); Standard Deviation (SD); Confidence Interval (CI)

*Effect sizes (Cohen's d) were calculated by the sample standard deviation of the mean difference.

**Significant at p-value < 0.05

According to Table 2, the researcher conducted an analysis based on Independent t-tests to compare the average scores for information literacy of the group who learned through the blended learning model through the use of active learning and the group who learned through a traditional method. The results demonstrated that the average score for information literacy of the experimental group was 29.56 (SD = 2.05), while the average

score for the control group was 17.22 (SD = 1.46). A comparison of the average scores revealed that the learners who learned using the blended learning model through the use of active learning scored higher than those who learned through a traditional method at a statistical significance level of .05 and effect size is 6.59, which is considered a large influence.

2.2 After five experts performed a validation process on the blended learning model through the use of active learning to enhance the information literacy of undergraduate students, the results showed an IOC of .91, indicating that the details of the model were congruent and could be used in class.

Discussion

The findings of this study demonstrated that the students in the experimental group who learned the lessons with the blended learning model through the use of active learning in the Educational Technology course have received higher Information Literacy scores, than the controlled group, which have been taught using a normal approach, at .05 levels of significance and effect size is 6.59, which is considered a large influence. This is because the learning model involves analyzing and synthesizing frameworks, theories, and the principles of a blended learning model through the use of active learning. In addition, the information about the learning and teaching conditions and problems were employed in order to determine the teaching and learning steps. The quality of this teaching method was also verified by experts and evaluated by the learners. Teaching and learning using a blended learning model through the use of active learning, yielded positive effects on the improvement of learners' abilities. This is consistent with Parramore (2019), who proposed that instructors should focus on providing knowledge and practical lessons, as well as acting as facilitators who encourage learners to think and offer suggestions. Ertmer and Glazewski (2019) pointed out that learning through systematic practice until learners could create their work encouraged learners to think critically and solve problems, resulting in effective learning.

The validation of the model by experts revealed that the components, steps, and activities of the model were suitable to use in class because the research had been systematically conducted the research with the clear operation and had continuously revised the process until it yielded effective outcomes and a suitable model. This is consistent with Ellis et al. (1991) who suggested that a systematic teaching model consists of an interaction system, response principles, teaching factors, application of the model, and outcomes. In addition, Khammanee (2016) pointed out that a model must be able to create a test tool, provide an explanation, and contain a structural relationship. It must be revised until it is suitable for use in class.

Conclusion

The strengths of the enhancement of information literacy with active blended learning are the integration of technology with various learning activities to cultivate information literacy among learners so that they can acquire more knowledge. The application of the Big Six and active learning process to enhance information literacy will change the learning atmosphere in class as well as instructors' roles. Instead of teaching through lectures, instructors will perform activities in class to engage learners in the learning process, encourage them to interact with instructors and classmates, allow them to work together, and cultivate a sense of responsibility through practice. Consequently, learners will be able to generate bodies of knowledge, and instructors will increase interaction with learners through activities and communication tools. Learners will be happy and enjoy learning because information technology

creates a safe zone where they can express their opinions and work together. They will connect existing knowledge with new knowledge, and enlightenment will further boost their desire to learn, triggering the opportunity to learn and improve themselves, thus leading to lifelong learning (Şengel, 2016; Kolb & Kolb, 2018; Dewey, 2018; Wood, 2019; Huang et al., 2019; Bollinger & Gillingham, 2014; Law & Chuah, 2019; Siegle, 2020; Seifi et al., 2020; Tanis, 2020).

Recommendations

1. Blended learning environments should be fostered by educational institutions by equipping them with the necessary tools, equipment, and infrastructure. Additionally, proficiency in using Information and Communication Technology (ICT) should be ensured for both teachers and learners.

2. Teachers are assigned a pivotal role in the context of blended learning. A deep understanding of the learning process must be possessed by them. Since learners may not be familiar with self-directed learning, strategies to motivate learners need to be developed by teachers.

3. Activities designed to enhance information literacy skills are incorporated by this learning format. If applied to other courses, both theoretical and practical components should be included. This approach will allow learners to be offered practical experiences for the further development of their information literacy skills.

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Ethics Statement

This study was approved for ethical research involving humans by the Human Research Ethics Committee of Nakhon Ratchasima Rajabhat University, Thailand (Number: HE-078-2020).

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