A Study of Use and Supporting Factors to Effective Use of Open Educational Resources Towards Active Learning in the Context of Higher Education in Thailand

การศึกษาสภาพการใช้และปัจจัยส่งเสริมการใช้ทรัพยากรทางการศึกษาแบบเปิดอย่างมีประสิทธิภาพสำหรับการเรียนการสอนเชิงรุกในบริบทอุดมศึกษาไทย

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ABSTRACT

Open educational resources (OERs) is a concept potentially enabling knowledge to be freely transferred under copyright regulations. With accessibility of the resources in digital formats, OERs can be used as a tool towards cognitive partnership to expand thinking process as users participate in learning activities which involve searching, retrieving, brainstorming, creating new knowledge and resources, and uploading the resources back to the resource repository to redistribute. The purposes of this study were to investigate the current situations of use of OERs for teaching and learning in higher education in Thailand, and to explore elements and factors that promote effective use of OERs in active teaching. This study was a mixed methods research consisting of two parts. Part 1 dealt with quantitative data from the questionnaire regarding instructional use of OERs from 198 instructors and 416 master students affiliated with institutes of higher education in Thailand. Part 2 was qualitative research study engaging 8 experts in order to identify supporting factors and the roles of those involved to the success of OER activities and the process of its use for active learning. The findings showed current use of OERs in which the instructors assigned students to search for information from OERs. Such teaching activities, however, did not have a clear process to put into practice. In terms of OERs, adaptation or reflection of new knowledge from the use of OERs, education on and promotion of ethical use of OERs, joint use, joint contribution to the development, and sharing of the resources are considered a constructive force to the continuous and sustainable cycle of open education. In addition, 4 elements of the OPEN sources and the roles of SMART students and instructors are regarded as a factor encouraging effective use of OERs in order to further develop the learning process model of active learning in a systematic manner.

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บทคัดย่อ

ทรัพยากรทางการศึกษาแบบเปิด (OERs) เป็นแนวคิดที่มีศักยภาพในการถ่ายทอดความรู้อย่างเสรี การใช้งานร่วมกันภายใต้ลิขสิทธิ์ และความสะดวกในการเข้าถึงทรัพยากรในรูปแบบดิจิทัล OERs สามารถใช้เป็นเครื่องมือร่วมเพื่อการทำงานทางปัญญา (Cognitive Partnership Tools) ขยายความคิดของผู้เรียน ซึ่งเกิดขึ้นเมื่อผู้เรียนได้ทำกิจกรรมการเรียนรู้จากการสืบเสาะค้นหา เรียกใช้และระดมความคิดเห็น สร้างสรรค์ความรู้และทรัพยากรใหม่ และบรรจุกลับในคลังทรัพยากรเพื่อเผยแพร่ต่อ วัตถุประสงค์ในการศึกษานี้เพื่อศึกษาสภาพการใช้ OERs สำหรับการเรียนการสอนในระดับอุดมศึกษาไทย รวมถึงศึกษาองค์ประกอบและปัจจัยส่งเสริมการใช้ OERs สำหรับการเรียนการสอนเชิงรุกอย่างมีประสิทธิภาพ การศึกษานี้ใช้รูปแบบวิธีการวิจัยแบบผสมผสาน โดยขั้นตอนที่ 1 ศึกษาข้อมูลเชิงปริมาณจากการสอบถามสภาพการใช้งาน OERs เพื่อการเรียนการสอน จากคณาจารย์ จำนวน 198 คน และนักศึกษาระดับปริญญาบัณฑิต จำนวน 416 คน ในสังกัดสถาบันอุดมศึกษาไทย และขั้นตอนที่ 2 ศึกษาข้อมูลเชิงคุณภาพ จากผู้เชี่ยวชาญ จำนวน 8 คน เพื่อหาปัจจัยส่งเสริมและบทบาทของผู้เกี่ยวข้องสู่ความสำเร็จด้านกิจกรรมและกระบวนการใช้งาน OERs สำหรับการเรียนรู้เชิงรุก ผลการศึกษาแสดงให้เห็นสภาพการใช้ OERs ในปัจจุบัน ซึ่งผู้สอนมีการมอบหมายให้ผู้เรียนค้นหาความรู้จาก OERs แต่กิจกรรมการสอนไม่ได้มีกระบวนการที่ชัดเจนในการฝึกปฏิบัติ การปรับประยุกต์หรือสะท้อนองค์ความรู้ใหม่จากการใช้งาน OERs การให้ความรู้และส่งเสริมให้ผู้เรียนมีจริยธรรมการใช้งาน OERs การมีส่วนร่วมใช้ ร่วมพัฒนา ร่วมเผยแพร่ และแบ่งปันของผู้เกี่ยวข้องถือเป็นการสนับสนุนวัฏจักรการศึกษาแบบเปิดอย่างต่อเนื่องและยั่งยืน นอกจากนี้แล้ว 4 องค์ประกอบของความเป็นรูปแบบเปิด “OPEN” และบทบาทของทั้งผู้สอนผู้เรียนและผู้สนับสนุนกระบวนการในลักษณะ SMART นับเป็นปัจจัยส่งเสริมการใช้ OERs อย่างมีประสิทธิภาพต่อยอดไปสู่แนวทางการพัฒนารูปแบบกระบวนการเรียนการสอนเชิงรุกอย่างเป็นระบบ

Introduction

Learning through Open Educational Resources (OERs) which are extensively available on the information network is considered one dimension of the Education for All paradigm. The accessibility of the knowledge contents and educational resources helps expand learning opportunities for all learners at all levels. As stated by UNESCO (Johnstone, 2005), “Open Educational Resources champions the sharing of knowledge worldwide to increase human intellectual capacity.” D’Antoni 2009) has further discussed the benefits of OERs to educational institutions, referring to the sharing of academic knowledge. The cost of content development has been reduced for better quality. Educators will also benefit considerably from sharing and adding academic value to the contents. This concept is consistent with Commonwealth of Learning’s (2011) statement that the success of producing and sharing OERs relies on joint use of the information regardless of the location of the users. They can be in the same place, in the same country, or anywhere in the world across the global network. Shared media and materials are open for others to customize and use, recognizing the nature of collaborative work as a team, and continuous revision of ideas arising from joint construction and sharing of such educational resources.

According to the “5R’s Model” (Wiley, 2014) the features of open educational resources that can be reused consist of: **Retain:** make and own a copy, **Reuse:** use in a wide range of ways, **Revise:** adapt-modify-improve, **Remix:** combine two or more, and **Redistribute:** share with others. In addition,

Downes (2007) has identified the "4 Freedoms" of using OERs, namely: 1) Freedom to copy, 2) Freedom to modify, 3) Freedom to redistribute, and 4) Freedom to redistribute modified versions.

Although OER users have freedom and flexibility to copy, modify, and reuse these open educational resources to a certain extent, there are still terms and conditions of use under the copyright regulations known as Creative Commons licenses (CC licenses). This international standard requirement provides a framework to control permission to use OERs. Some resources allow only copies, while others set out terms of agreements for users to customize to their resources (OECD, 2007). CC licenses are thus crucial to the promotion, distribution, and increase utilization rate of OERs worldwide.

Cohering to Thailand's educational policy, with its perspective framework of the second 15 years long range plan on higher education plan: 2008-2022 (OHEC, 2007) to develop and enhance the quality of higher education in the country, a guideline has been introduced to enhance educational infrastructures towards "Lifelong Learning" in higher education in Thailand. An emphasis is therefore placed on creating incentives to advocate extensive learning by bringing out the University's instructional resources to the public (Open Courseware) via the Internet network. Not only will this initiative naturally contribute to the improvement of teaching material quality, but also lead to teaching innovations such as 1) open systems of instructional media, and 2) opportunities for instructional media of excellence to be distributed and used throughout the country. The study of Na-songkhla and Chen (2013) has examined issues related to open educational resources and teaching methods in the academic views of Thai scholars. It revealed basic understanding of OERs, integration into academic curricula and instruction, accumulation of OER quality, and teaching and learning design to promote higher-order thinking and learning ethics, focusing on the development of OER guidelines corresponding to their instruction. OER offers an open content, yet it is also a new pathway of teaching and learning to which Thai academics need to pay attention. All parties involved must be aware of the potential scope of work, and of the imperative issues in promoting ethical use of OERs through the thinking methods, learning, and sharing.

Active learning process through the use of OERs is another technique accentuating learning by doing. According to Yin and Fan (2011), OERs will be evolved into Open Educational Practices (OEP). By practicing learning activities based on exchange and collaboration process, OEP concentrates on students' learning experiences rather than the contents they are given. Fundamental aspects of OEP are monitoring, cooperation and contribution, OERs production, and the use of OER as a social activity to demonstrate the potential to create and customize learning materials available on the Internet. Concurringly, Wenk (2010) and McGreal et al. (2012) have presented case studies to illustrate approaches in applying educational resources to improve the instructors' teaching and to reuse them in designing instruction

to achieve effective outcomes. This is in line with Commonwealth of Learning (2011), asserting that the success of the OERs production and sharing depends on collaboration and use of these materials regardless of the users' location, whether at the same place, in the same country, or across the global network. Shared media and materials can be customized and used, with users being mindful to the nature of working together as a team, and continuous improvement of various ideas emerging from the partnership in joint construction and sharing of these educational resources.

However, in the context of Thai higher education, there has not been substantial research on teaching activities through an OER development guideline. This research was carried out to investigate 1) the current situations regarding instructional use of OERs in higher education in Thailand to promote and find an approach to utilize OERs for active learning that suits the context of higher education of Thailand, and 2) elements and factors promoting the efficient and cost-effective use of OERs for active teaching to accumulate data to use as a guideline towards developing the active learning process through the use of OERs to adjust to practice-based learning activities.

Research Objectives

1) To investigate the current situations on the use of OERs in learning and teaching in the Thai higher education context

2) To identify the elements and factors supporting the use of OERs for active learning efficiently and cost-effectively

Research Methodology

This study was mixed-method research divided into two parts. Part 1 involved quantitative research to explore the current situations of OER use among university students and lecturers in Thailand. Part 2 was qualitative research to survey experts' opinions on guidelines concerning the use of OERs for active learning, and factors supporting their effective use in higher education. The details are illustrated below.

Part 1 explored current situations of the instructional use of OERs. The sample group was composed of 198 faculty members and 416 graduate students, chosen by stratified sampling from 5 institutional categories of tertiary education in Thailand. These were: 1) public universities, 2) public autonomous universities, 3) private universities, 4) Rajabhat universities, and 5) Rajamangala Universities of Technology. The samples from each category were then further selected based on the criteria that they had to be 1) an educational institution which offered programs in science,

technology, and educational technology and communications, and 2) an educational institution that strongly advocated the use of information technology for teaching and learning. The tools used to collect data were 1) a questionnaire on the current situations on the use and design of active teaching employing OERs, targeting lecturers affiliated with higher educational institution in Thailand, and 2) a questionnaire on the use and comments on OERs for learning, targeting master students in higher education institutions in Thailand.

Part 2 was concerned with an investigation on opinions of 8 experts in related fields in order to formulate guidelines on the use of OERs for active learning, and factors promoting effective use of OERs for teaching and learning in tertiary education. The specialists were selected by purposive sampling with the criteria of having an expertise in instructional design and development in higher education, or in innovation and educational media development. The tools used for data collection were semi-structured interviews on approaches and factors promoting the use of OERs for instruction in higher education.

Development and Validation of Research Instruments

1) In terms of the questionnaire on the current conditions of use and design of active learning using OERs aiming at university lecturers in Thailand, the quality of the instrument has been validated by means of item-objective congruence; covering the questions, the use of language, and the question formats. The draft of the questionnaire created based on structural issues on OERs and OER framework of use was verified by 7 experts on its content validity. It was then tried out on 10 lecturers of similar background to the targeted sample group to check the reliability, the language use, and interpretation of the draft questionnaire.

2) As for the questionnaire on the current conditions of use and opinions concerning OERs for learning aiming at university students in Thailand, the draft of the questionnaire developed had been verified for its content validity by 7 experts by means of item-objective congruence. It was then revised and brought to trial on 30 undergraduate students to check their understanding of the questions in order to check the reliability of the questionnaire.

3) As for the semi-structured interviews on the guidelines and the factors promoting the use of OERs for learning and teaching in the context of higher education targeting the experts, the interview form had been verified by 3 experts on its accuracy, appropriateness of the language use, clarity, completeness, and whether or not it covered the key issues.

Results

Part 1: Results from the survey distributed to university lecturers and postgraduate students in tertiary institutions in Thailand about the current situations of the use of OERs for active learning in higher education in Thailand

1) Survey results from university lecturers on instructional use of OERs

1.1 General information of the respondents

Table 1. General information of the respondents (N=198)

	Information	Number (N)	Percentage
Gender	- Female	107	54.0
	- Male	91	46.0
Age	- 41-45 years old	60	30.3
	- 46-50 years old	49	24.7
	- 36-40 years old	45	22.7
	- Others	44	22.2
Working areas	- Academic (lecturers and teaching assistants)	184	92.9
	- Supporting staff	9	4.5
	- Administrative (administrators/heads of department)	5	2.5
Teaching areas	- Science – Technology	113	57.1
	- Social Science – Education	57	28.6
	- Others	28	14.3
Teaching experience	- 3 - 6 years	68	34.3
	- 7 -10 years	58	29.3
	- More than 10 years	44	22.2
	- Less than 3 years	28	14.1

As shown in Table 1, the sample group consisted of 198 respondents, 107 of which were female (54.0%), and 91 were male (46.0). The majority of them, 184 people (92.9%), were academics, including lecturers and teaching assistants. Among these, 113 people (57.14%) were in the field of Science – Technology, and 77 (28.57%) were in Social Sciences-Education. The respondents' teaching experience was mainly between 3-6 years (34.3%) and 7-10 years (29.3%).

1.2 Current situations of the use of OERs and the design of instructional activities

Table 2. Current situations of the use of OERs and the design of instructional activities (N = 198)

List of questions	Frequency	Percentage
1) Have you applied resources from OERs to produce your teaching materials?		
- Yes	142	71.6
- No	56	28.4
If yes, how are the resources used? (More than one answer can be selected.)		
- Used partially, only relevant and required parts (Revise)	106	42.4
- Used as a model to create new work (Revise)	39	15.6
- Rearranged, re-created in your own format (Redistribute)	20	8.0
2) Have you studied and made sure you understood the terms and conditions of use prior to using OERs?		
- Yes	90	44.8
- No	69	34.4
- Others	39	20.8
3) How have you complied with the OER terms and conditions of use? (More than one answer can be selected.)		
- Having cited the source of the resources used	62	24.8
- Having cited the source, and used the resources for noncommercial purposes	42	16.8
- Having cited the source of the resources, and used them in the original formats	28	11.2
4) Have the teaching activities in your courses assigned students to search for instructional media from OERs?		
- Yes	142	56.8
- No	56	22.4
5) Have you always informed your students about the OER terms and conditions prior to the use?		
- Yes	120	60.4
- Others	44	22.0
- No	34	17.6
6) Have the teaching activities in your courses suggested or assigned students to apply OERs to create innovations?		
- Yes	115	58.0
- No	83	42.0
If yes, how are the resources used? (More than one answer can be selected.)		
- Used partially, only relevant and required parts (Revise)	106	42.4
- Used as a model to create new work (Revise)	39	15.6
- Rearranged, re-created in your own format (Redistribute)	20	8.0

Table 2. (Con.)

List of questions	Frequency	Percentage
7) Have you and your students contributed to uploading the resources back to OERs to redistribute to the public and to other users?		
- No	133	67.2
- Yes	65	32.8
8) Have you experienced any problems from using open educational resources in your teaching?		
- Yes	92	46.4
- No	65	32.8
- Others	41	20.8
9) If there are any reasons for you not wanting to use OERs, what are they?		
- A lack of help in case of problems in using and accessing the resources	38	19.2
- OERs did not correspond to the purposes and intended use.	36	18.0

Table 2 presents the current situations of use of OERs in higher education in a Thai context. Based on the questionnaire completed by university lectures, the findings can be summarized as follows. To begin, 76.8% of the faculty members have used OERs in their teaching. 52.8% agreed that the availability of OERs at present was sufficient for teaching and research, yet they were not easily accessible. Most respondents, accounting for 71.6%, had adapted media resources from OERs to create their own versions of teaching materials. In terms of the lecturers' use, 42.4% have utilized these educational resources to a certain degree, particularly only those relevant and required (Revise). Prior to using OERs in their instruction, 44.8% of the lecturers had studied and understood the terms and conditions applied. In regards to other reasons on the understanding of CC License, 20.8 reported that most of the open sources available were regulated by CC License, so some of them did not carefully study it while others had never done so because they did not consider it necessary. 24.8% of them had taken into account the terms and conditions of OER use by referencing the original source of the resources.

In regard to teaching activities, most instructors (56.8%) had assigned their students to search for instructional media available in OERs. 60.4% reported that they would always educate the students about the copyright regulations before using them. 22.0% of the respondents gave other reasons. Some mentioned that they have informed students on the matter and found that the students rarely paid attention to it. It was also added that whether or not the instructions were taken was the students' choice. 58% of the respondents had suggested or assigned their students to adapt existing OERs and produce their own innovative creations. Most activities, accounting to 42.4%, have only applied OERs in part; particularly those relevant and required (Revise). 67.2% did not, however, participate in uploading

the resources back to the public and other parties. 46.4% of the instructors have experienced problems using OERs. As for other problems, 20.8% of the respondents indicated that the desired part could not be extracted from the media resources. Likewise, some of the content and information of the resources were not valid. 19.2% remarked that the reason for them not wanting to use the resources were the lack of assistance when experiencing problems about the use and access of the resources, and 18.0% stated that the OERs presently available did not correspond to their purposes and the intended use.

2) Results from the survey on master students regarding the use of OERs in learning

2.1 General information of the respondents

Table 3. General information of the respondents (N = 416)

	Information	Number	Percentage
Gender	Female	211	50.7
	Male	205	49.3
Year of study	4th year	144	34.6
	3rd year	106	25.5
	2nd year	56	13.5
	1st year	55	13.2
	5th year	47	11.3
Experience and competence in using computers and network systems for learning	- Over 8 years	243	58.4
	- 5 - 8 years	118	28.4
	- 2 - 5 years	46	11.1
	- Less than 2 years	8	1.9
Experience in learning through network systems	- e-Learning of the courses studied	216	51.9
	- Assigned by the lecturers	202	48.6
Reasons for using computers and the Internet for learning (More than one answer can be selected.)	- To find answers to questions	256	61.5
	- To develop self-directed learning	246	59.1
	- To find solutions to problems	211	50.7

Table 3 shows general information of the postgraduate students responding to the survey. There were 416 respondents included in this section of the study, 211 of which were female (50.7%), and 205 were male (49.3%). The majority were in their senior year (34.6%) and junior year (25.5%). Most of the respondents (58.4%) had experience and competence in using computers and network systems for learning for more than 8 years. Over half of the students, 51.9%, had experienced e-Learning in the courses they enrolled in. The main reasons for their use of computers and Internet network for learning were 1) to search for answers to the question they had, 2) to develop self-directed learning, and 3) to find ways to solve the problems they had. The percentages were 61.5%, 59.1%, and 50.7%, respectively.

2.2 The use of open educational resources for learning

Table 4. The use of OERs for learning (N = 416)

List of questions	Frequency	Percentage
1) Do you know the sources of OERs?		
- No, I have never known about it	211	50.7
- Yes	205	49.3
2) Basic knowledge and understanding about OERs (More than one answer can be selected.)		
- OER is a compiling source of electronic lessons.	186	44.7
- OER is a source of additional information for research.	183	44.0
- OER is a source to support students, lecturers, researchers, and other interested parties.	112	26.9
- OER is a source of free lessons for self-learning.	96	23.1
3) How have you used OERs? (More than one answer can be selected.)		
- To study new contents you are interested in and have never studied before	190	41.7
- As a source of supporting resources for learning	161	38.7
- As the media to develop your own skills and abilities	101	24.3
- As a model of learning resources to solve specific problems	86	20.7
- As a medium for exchanges of knowledge between your peers or teachers	83	20.0
4) Have you searched for any resources from OERs to apply in your learning? (More than one answer can be selected.)		
- Yes	292	70.2
- No	124	29.8
5) How have you applied media resources of OERs in order to create your own learning materials? (More than one answer can be selected.)		
- Used partially, only relevant and required parts (Revise)	193	46.4
- Used all for studying purposes (Reuse)	186	44.7
- Combined with other resources to solve specific problems (Remix)	95	22.8
- Used as a model to recreate in a new direction (Revise)	88	21.2
- Rearranged, reorganized in your own format (Redistribute)	81	19.5
6) Do you know that OERs can be reworked?		
- No	196	47.1
- Yes, I have been informed by an instructor	120	28.8
- Yes, I know it from my own research	82	19.7
- Yes, I have been informed by a friend	16	3.8
- Yes, I have been informed by other sources (news, social media)	2	0.4
7) How have you complied with the OER terms and conditions of use? (More than one answer can be selected.)		
- Having cited the source of the resources used	182	43.8
- Having cited the source of the resources, and used them in the original formats	120	28.8
- Having cited the source, and used the resources for noncommercial purposes	103	24.8

Table 4. (Con.)

List of questions	Frequency	Percentage
8) Do you think sufficient sources of OERs will help support your learning?		
- Yes, a lot	198	47.6
- Yes, a little	175	42.1
- Not sure	43	10.3
9) Do you think using OERs will help promote collaborative learning, and exchanging more knowledge and information with those involved, for example between experts, learners, and lecturers?		
- Yes, a lot	205	49.3
- Yes, a little	161	38.7
- Not sure	40	9.6
- No, not at all	10	2.4

As shown in Table 4, 49.3% of the students knew the sources of OERs. In terms of knowledge and understanding of OERs, most students have identified them as the sources for gathering e-learning contents (44.7%) and additional research information (44.0%). OERs were utilized for learning new lessons and contents the students were interested in or had never learned before, and also as resources to assist their learning. The percentages were 41.6 and 38.7, respectively. Most students, accounting to 70.2%, have searched for resources from OERs and applied them for their own use. In terms of the methods of adaptation to create learning materials, 46.4% have partially used the existing resources, only the relevant sections they needed (Revise). The majority of students (47.1%) did not know that OER could be reworked. Most students (43.8%) have cited the original sources of the resources that they used, complying with their terms and conditions. 47.6% of the respondents believed that adequate OERs would help support their learning. Additionally, 49.3% agreed that OERs would help encourage more collaborative learning and the exchange of knowledge with those relevant such as the specialists, students, and instructors.

Part 2: Opinions of the experts on the guidelines and the factors promoting the use of OERs for learning and teaching in higher education with efficiency and cost-effectiveness. The results of the interviews from 8 experts specialized in instructional design and development in higher education and in innovation and educational media development can be summarized as follows.

1. OERs should be used with profound understanding of their characteristics and significance. It can be said that the framework for use and critical factors to the success of OERs require the people involved to have basic knowledge and understanding of the "OPENNESS" of OERs which are:

1.1. Open mind – Accept and prioritize the importance of the open resources, build up common values and visions, have an open mind to welcome and share the information, body of knowledge, and materials in order to achieve a culture of sharing information which is vital to the use of OERs.

1.2. Open license – CC Licenses protects the copyrights over the work and its scope of use. The attributes such as raising awareness and cultivating ethical use with respect and honor to the contributors should be encouraged among students in order to achieve the culture of sustainable use of OERs.

1.3 Open format – Forms and platforms that are open allow joint adaptation to meet the user's objectives and intended use, search query, retrieval which relies on Metadata standards to make the search possible and quick, and the applications based on the usage pattern including Reuse, Revise, Remix, and Redistribution.

1.4 Open access – The access should be easy and convenient, not restricted only to certain groups of users. The formats of use should by no means be limited. The freedom of access should permit everyone to use. An open system should be accessed if one can confirm their identity of use. Assigning users according to each level of rights and categorizing them will effectively benefit the learning management.

2. Elements and factors contributing to the instructional process through the use of OERs towards active learning

2.1 Basic infrastructures – The Basic infrastructures included internet network, computer hardware and software used, as well as technology appropriate and supportive to the processes and activities; should be prioritized.

2.2 Resources management system and Open Educational Resources – OERs available on the Internet or resource management systems across the network developed by an institute have to provide a searching system, a storage system, and a retrieval system. They also have to feature a section identifying the terms and conditions of the open usage, taking into account the sources to support the use.

2.3 Course content characteristics – Characteristics of the course content ideal for practice activities designed to promote the process. The experts concurred that the approach could be applied in almost every subject. With contents that highlight analytical thinking, creativity, showing cause and effect, and logical reasoning that does not yet have a clear answer; learning activities can be designed and analyzed so that students are able to participate in cooperative learning and joint practice, as well as to show appropriate reasoning.

2.4 The persons who involved in the process – The persons involved in the process include students, instructors, and supporting staff. With clear roles and responsibilities set out, each of these individuals play a prominent role in driving the process of promoting and encouraging efficient implementation of OERs.

2.5 Activities and strategies – Activities and strategies are based on the instructional design targeting the learning outcomes determined. The experts commented that the strategies employed may include asking questions, using a learning situation or an application of Problem-Based Learning (PBL) that stimulate students' thinking process. Students will be encouraged to think outside the box and develop existing items into something new or innovative and more useful. Activities employed should principally involve active learning activities highlighting the exchange of ideas, reasoning, and discussion. Based on group process activities built on rules and mutual agreements, students learn by doing and meanwhile contributing to shared learning environment. They help each other think, perform, learn, and collaborate. The process of formulating thoughts and reflections is transformed into creative work within the framework of instructions guided by the instructor. In designing the activities, the sequencing and learning conditions should be distinctly determined, defining precise learning process, roles, and responsibilities in each section in order to correspond to or contribute to the goal. Moreover, in order to promote efficient use of OERs, students should be simultaneously trained to think positively, to be open-minded to others' opinions and apply them to their own, and to cooperatively exchange ideas and knowledge with all parties.

2.6 Shared learning environment and atmosphere – Apart from the activities designed, organizing an Active Classroom will help support the atmosphere of collaborative and creative learning, taking into account physical contexts such as the setting of the classroom and available devices. Similarly, an Open Learning Environment (OLEs) should be provided within the educational system as it will help develop students' divergent thinking. Students can therefore do their own research and find a way to solve the problems by themselves.

3. The roles of those involved in learning process – The parties engaged in the process have to play an active role and act in a SMART manner as illustrated below.

3.1 The roles of instructors and supporting staff – As a SMART coach, instructors serve as a facilitator to motivate students to be able to show their ability and to support and nurture the students' potential to the fullest. The supporting staff such as educational technologists, computer personnel, and educational researchers should play a role as a SMART facilitator in encouraging the learning process. They are expected to give immediate feedbacks and recommendations to students

and instructors in order to create the active learning atmosphere. Features of a SMART Coach and a SMART Facilitator are:

• ***S = Select & Suggest:*** Instructors are responsible for selecting and recommending education resources related to contents and learning objectives to students. Similarly, the supporting team must be able to help select and recommend technology and media resources appropriate to the teaching and learning process.

• ***M = Manage & Motivation*** – Instructors play a crucial role in managing resources and teaching materials accompanying each step of the process, as well as in stimulating and creating the atmosphere constructive to students' learning experience.

• ***A = Accept & Adjust*** – Instructors are open to the use of media resources and respectful to the rights of others, and adjusted the applications suitable for their own teaching.

• ***R = Reuse & Revise & Remix & Redistribute & Retain (5R's Model)*** – Both the instructors and supporting staff play a major role in the production and development of instructional media. Existing media resources can be adapted based on the usage following the 5R's Model.

• ***T = Transform & Teaching*** – The transformation of information and educational resources through teaching activities is another role and responsibility the instructors should keep in mind.

3.2 Students' roles - Students serve as a SMART learner. With a constructive attitude as active learners, they are required to brainstorm, exchange views with others, and be open-minded to accept other's opinions. With the shared goal of collaborative learning, they are expected to be able to conform to the rules appropriately and willingly. In brief, students should have the following attributes:

• ***S = Select*** – Select the options suitable to the needs and objectives - The students should have basic awareness to receive and choose information (Media Literacy), which is another key factor in using information technology effectively.

• ***M = Make new things*** – Practice of creativity will lead to innovation.

• ***A = Accept & Attribute*** – Accept new things, distribute, and share - Students open up their mind and their brain to welcome the new learning approach and to participate in the dissemination of a body of knowledge for teaching and learning in the future.

• ***R = Reuse & Revise & Remix & Redistribute & Retain (5R's Model)*** – Get engaged in the application and revision appropriate to the proper framework of use. The use of media resources under the framework and the ethics in using, sharing, and redistributing of both students and the instructors will contribute to the dynamic accumulation of knowledge.

• ***T = Take Technology & Transform*** – Use a variety of technologies to make changes in new media innovations and redistribute. The advances in information technology have brought about new tools and technologies to present new knowledge, innovations, and resources easily and efficiently. Students should have a wide range of technology user attributes, and become a multi-technologist.

Discussion and Conclusion

This research was carried out to seek guidelines and to identify factors contributing to the success of the use of OERs for active learning activities with efficiency and cost-effectiveness. In-depth insights have been conceptualized regarding the learning process through engaging educational resources as a key element. Based on the study, conclusion can be drawn and recommendations for further study are proposed as follows.

1. The instructors' conditions of use of OERs - The study has revealed that the majority of instructors have used OERs. The resources have been adapted to produce instructional media as well as assignments for students to search for knowledge from the OERs and teaching activities. Nonetheless, their teaching activities did not contain a clear process in practical application of OER resources, their adjustment, or reflection of new knowledge, as implemented in Open Educational Practices (OEP). Owing to these features, OERs can lead to effective development of advanced skills with appropriate design of learning processes and activities cohering to learning objectives and contents which focus on learning-by-doing. Yin and Fan (2011) suggested a similar perspective that OERs would eventually be developed into Open Educational Practices (OEP) through the use of OER devices and technology, and interactions with the learning media resources regarding the use, exchange, and collaboration. The outcome of the open educational practices (OEP) will focus more on the learning experience rather than the contents that students should receive. The students will develop their intellectual strategies and control over their self-directed learning. The focal aspects of OEP are control, collaboration, and co-production. Creating and using OERs are a collaborative, social activity demonstrating the ability to create and customize the learning resources available on the Internet.

In line with this is McGreal, Sampson, Chen, Krishnan, and Huang (2012), affirming that the success of the use of OERs in teaching activities relies on the fact that OERs can be utilized to improve the teaching of the instructors. They can also be used as a core for building a community of practice among learners and educators. In addition, the use of OER will help increase the understanding of varying customization appropriate to each context of learning since OERs concern teaching designs in which instructors can better demonstrate the quality of their instruction. Furthermore, the fact that

the instructors ensure the students' understanding and awareness on the rights to use OERs will promote the students' moral and ethical use of the resources. In order to transform the learning culture in higher education of Thailand, it is imperative to be open-minded to different ideas and employ them as a supporting mechanism of the process (Na-songkhla, Chen, Birzina, Pushpanadham, Khirwadkar, Kováčová, Szüdi, Pistovčáková and Wang, 2014). With a good conscience to the society combined with the return of ideas, the body of knowledge, and new and quality OERs back to the society, this will induce the value of the sustainable development of the knowledge cycle.

2. The students' use of OERs and their opinions on knowledge, understanding, and the use - It was found that students were familiar with OERs as a collection of e-learning contents and the sources for additional information that students have adapted and applied in their learning. Most students, however, were not aware that OERs could be reworked or revised. Some of them had not been notified about the terms and conditions of OER use before. However, the majority of students considered the use of OERs beneficial to their learning. They also concurred with the idea that sufficient availability of OERs would assist them in learning, foster collaborative learning, and encourage more discussion with interested parties. This issue is consistent with the study of Lesko (2013) which discussed the use and production of OERs and Open Courseware (OCW) in effective public education. To be more specific, in using and producing these resources, the users lacked knowledge regarding the rights of ownership and copyrights of the use, reuse, and modification of OERs and OCWs. They were not aware of the user policies and regulations which regulated ownership and use of the resources created. Some users did not know that OERs or OCWs were available.

Understanding the use of OERs is hence a priority to bring the use of OERs into practice. Students' ethical use of the resources, their respect to the rights and honor to the contributors of the work should be inspired. Furthermore, students should be motivated to take pride in the shared usage, collaborative contribution and redistribution, and sharing of OERs. Not only will this allow them to develop their skills in learning through designing and developing educational resources, but also drive forward the continuous and sustainable cycle of open education. In accordance with this is the research of Na-songkhla and Chen (2013) on issues relating to OERs and teaching methods in the views of Thai scholars. The issues examined were basic understanding of OERs, the integration into the curriculum, the quality of OERs, and classroom teaching design for higher-order thinking and moral aspects of the learning outcomes, emphasizing the development of OERs to guide and respond to the teaching. OERs are not merely an open content, but rather a new pathway of learning and teaching that deserves considerable attention. All related parties must be aware of the potential scope of work, ethics in the use, as well as the way of thinking, learning and sharing these resources.

3. Elements and factors promoting the use of OERs towards active learning – OERs are not merely the sources of knowledge or the tools to transmit knowledge. Rather, they can be utilized as a tool to expand the knowledge and promote advanced skills of the students, along with practice activities which will contribute to more learning outcomes gained from their learning experience in the activities. Consequently, the findings based on the opinions of the experts on the information and key elements as a guideline in support of application of OERs in teaching and learning activities with practice through the use or Active Learning consist of 3 main parts, as follows.

1) Usage guidelines considering the knowledge, understanding, and awareness of the significance of OERs – OERs are educational resources which are openly available on the network. They are characterized as being open both in terms of accessibility which involved Metadata in order to be quickly retrieved and shared, and in terms of their usage based on the usage framework (Reuse, Revise, Remix, Redistribute, and Retain). The use and storage should take into account the requirements according to the CC License. Besides, the contents of new open media resources to be produced must be easy and quick for students to learn. Allocating the contents into small units which are flexible to be adjusted will lead to quality and efficient use of OERs in the search, retrieval, customization, and redistribution of the resources through Metadata (Downes, 2007; McGreal, 2010; Yin and Fan, 2011; Wiley, 2014).

2) Supporting elements – Elements and factors contributing to the process of teaching and learning by the use of OERs towards active learning are immensely influential in making the process a success, including infrastructure, resource management through network activities, the persons concerned, activities and strategies designed, as well as learning environment. These elements are regarded as the primary components for teaching and learning through practical use of OERs. Most importantly, the most significant matter is concerned with the policy to drive its implementation, demanding cooperation in all sectors. In terms of the contents; management staff, students, instructors, administrators, as well as supporting personnel must plan together, helping each other in the administration and moving forward collaborative production and development of OERs in order to achieve concrete management and outcomes.

3) The roles of the instructors and students in the teaching system – These are the fundamental elements contributing to the success of active learning activities through the practice on educational resources. These roles consist of 2 issues.

Firsts, instructors' roles and characteristics. That is, whether or not the teaching process will succeed depends on dedication, sacrifice, and the ability of the instructors. Correspondingly,

Manasaporn Vitoonmetha (2001, cited in Songkram, 2010) has identified the ability of teachers as an indicator of the quality and success of the instruction. Moreover, the instructors should be able to use information technology for their teaching and searching for teaching resources on the network. As a SMART Coach, the instructors are no longer the center of the body of knowledge and information. Instead, they instruct students to search and find the right information (Khlaisang, 2013) and transform the information, contents, and resources for their own teaching. Alternatively, they may play a role of a Smart Facilitator, directing the learning of students and helping with the instructional management to facilitate the learning of the students. The most essential feature of the instructors to support the teaching model through the use of OERs relies on their acceptance and an open-minded attitude towards OERs, willingness to redistribute and share the resources within the framework of the copyrights, and raising of awareness on the value and significance of an open learning system.

Second, students' roles and characteristics as a SMART Learner. Students should be equipped with knowledge and understanding, as well as the skills and the use of information technology for the practice and learning activities. The main objective is to enable them to search for OERs to use in their own learning process. Learning by practice with group activities and teamwork is highlighted, taking into account the students' different learning styles (Kaosaiyaporn, 2011). Students should also be considerate and open to accept others' opinions. They should cultivate the learning goals and outcomes and create and establish the foundation of understanding in matters regarding the use of OERs. Moreover, they should participate in joint dissemination of the resources. In order to promote the guidelines on effective use of OERs, these roles should be carried out simultaneously. The process will result in students using technology in a wide range of features and becoming a multi-technologist.

Recommendations and suggestions for future research

1. At an institutional level regarding the use of OERs, the study has revealed that both instructors and students required OERs for their teaching and learning. They have reported their use in seeking, searching, and storing OERs. Therefore, if each institutes develop OERs management system as a supporting tool and as a knowledge repository to expand educational resources, it will substantially support teaching and learning activities of the institutes.

2. Based on the results of the survey on students' opinions regarding the use of OERs, it was revealed that the students used these resources in spite of their unawareness of the terms and conditions of use. Therefore, it will prove worthwhile to conduct a study on ethics of use of OERs in order to seek ways to promote the values of ethical use in the educational context of Thailand.

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