Exploring Thai Distant Learning Using Satellite TV (eDLTV) and Problem-Based Learning

Worapapha Arreerard

***Abstract*—To solve the problems of teacher shortage and their indirect educational qualifications in the underprivileged rural schools, the Government of Thailand has issued the policy to use eDLTV media (Electronic Distance Learning TV Media) in its pedagogical system. Rajabhat Maha Sarakham University is assigned as one of the educational institutions to promote the application of such media in the Northeast of the country. Assigned by the university, and to support the mission, the researcher has conducted this study with the following objectives: 1) to develop a model of participatory eDLTV media technology transfer to promote learning at Phrapariyattidhamma Schools (PDS) by using Project-Based Learning (PBL) activities; 2) to study the results of the experiments of using the model's manuals and tools; 3) to examine the results of acceptance and application of eDLTV media technology for the learning of PDS. The samples were 99 teachers and 956 students in this study, purposively selected from 1,435 students from 9 PDS in Sisaket Province. The instruments used were three questionnaires and manuals on participatory eDLTV media technology transfer. The results of the research showed that the model of participatory technology transfer of eDLTV is a form of participatory collaboration of 3 important agencies: RMU, PDS, and NSTDA (National Science and Technology Development Agency) as they together define roles, duties, and activities to promote learning in 3 phases. The overall teachers' opinions towards the model experiment showed the most suability of the model in use. The significance of this model relies upon after the training, 100 % of teachers were able to apply eDLTV in PBL in various subjects even though they had no experience in using eDLTV before.**

***Index Terms*—eDLTV media, participatory, project-based learning, diffusion technology, technology adoption.**

I. Introduction

In Thailand, particularly in rural areas, one of the most critical problems in primary or secondary schools is 'teacher shortage'[1]. This problem can be understood in two senses. The first is that the teacher shortage occurs when there are inadequate teachers compared with students. However, the second problem is far more problematic than the first as inadequate teachers in the critical subject areas. In many areas of the country, teachers are asked to teach subjects that do not relate to their educational backgrounds. For example, teachers who completed Bachelor's Degree in Social Studies may be asked to teach Science, Mathematics, Technology, or even English. How will students be good at such learning subjects when their teachers have no expertise or experience in teaching subjects, they do not have qualifications? This causes poor learning results for students in many schools [2].

To solve the problem, the government of Thailand has issued a policy to use the innovation called 'eDLTV media (Electronic Distance Learning TV Media)'- an innovative e-learning system for distance education via satellite or eDL-Square system developed by the National Center for Electronics and Computer Technology (NECTEC)'- in teaching or learning. The government has then assigned the Office of the Basic Education Commission (OBEC), an agency under the Ministry of Education - the central unit in the management of education at primary and secondary levels - to use eDLTV to develop the education of the country, particularly for the education for underprivileged schools in the countryside. In addition, eDLTV is the technology of distance e-learning system of the Information Technology Project under the Royal Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn. Its pedagogical contents are obtained from teaching materials of Wang Klai Kangwon School, Prachuap Khiri Khan Province contained in the eDL Square system (Electronic Distance Learning Square System) [3] and used in teaching and learning of 80 schools participating in the Information Technology Project under the Royal Initiative. Most of them are provincial schools located in remote rural areas with fewer educational opportunities and facing the problems of teachers' shortage and indirect educational qualifications of teachers [4].

eDLTV media is a product innovation that uses the eDL-Square system, an instructional media management system program, and the pedagogical contents from Wang Klai Kangwon School to create teaching materials in the form of 'Online Electronic Media' on the website 'http://edltv.thai.net'[5]. The system can be installed into a one terabyte hard disk for schools to use offline learning. eDLTV consists of two parts: eDL-Square instructional management system and developed learning contents with four teaching media systems: eDLTV for Primary School, eDLTV for Secondary Schools, and eDLTV for Primary School Vocational Development and eDLRU system. This system contains 73,667 pieces of electronic pedagogical media [6], [7].

The promotion of eDLTV in teaching and learning had been operated by 35 Rajabhat Universities throughout the country. Rajabhat Maha Sarakham University (RMU) promotes the application of eDLTV in 1,194 network schools in the Northeast: Mahasarakham, Khon Kaen, Kalasin, and Roi Et provinces. Based on the results of teacher training organized by RMU, eDLTV is now available in all 1,194 schools, and most teachers can use it in teaching. Based on the previous research, most teachers use it as a teaching

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medium in the classroom or even a learning resource in the library, classroom, or laboratory for students to study during or outside school hours. The teachers enjoy applying various teaching media and are satisfied with the recommendations of their peers, educational supervisors, and lecturers [6].

Like the secular schools, 'Phrapariyattidhamma School (PDS)' faced a shortage of teachers. The government, therefore, has issued a policy for PDS to use eDLTV media in teaching and learning to solve the problem. PDS is a form of monastic education of the Buddhist Sangha, the government has set up according to the wishes of the monks, and it is a school established in a temple or at the monastic land or the land of a Buddhist Foundation to provide education to monks and novices [8]-[10]. In Sisaket Province, 9 PDS participate in the Information Technology Project under the Royal Initiative. The schools are located in rural areas in different districts, with different educational readiness contexts such as teachers, students, materials, equipment, and learning materials. The schools' teaching and learning management consist of 2 programs: 1) Phariyatti-Dhamma Curriculum that provides teaching and learning following religious teachings such as Buddha's history, monastic disciplines, and Pāli language; 2) General Education Curriculum with 8 learning subject groups. Both programs are taught by teachers who are Buddhist monks and laypersons. Most students are novices with different educational backgrounds. Nevertheless, most of them come from underprivileged families.

In response to the government policy sponsored by the university, the researcher was assigned to conduct a study to disseminate and transfer the use of eDLTV to teachers in Sisaket PDS. As the project collaborates with the Information Technology Foundation under the Royal Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn to create the model of participatory eDLTV technology transfer by using PBL activities for the subjected schools, the researcher expects it to promote learning and practice for teachers to be able to apply eDLTV in real-life situations together with the use of PBL activities to create understanding, motivating, and stimulating students' learning both in the classroom and in real learning sites. To transfer knowledge through PBL, the researcher has created learning activities for both teachers and students and a participatory learning environment supporting the development of learning skills in both online and offline formats. As a result, the schools have ready learning resources and can effectively use eDLTV media in a pedagogical process. As mentioned, this study was carried out to solve the problems of 9 PDS in Sisaket Province. However, the significance of this research is that other 399 PDS and other type schools in Thailand can use the research results to develop their pedagogical system as this research can be repeated and re-conducted in other areas.

II. Research Objectives

This research has been carried out with the aims a) to develop a model of participatory eDLTV technology transfer to promote learning at PDS by using PBL activities; b) to study the results of the experiments of using the model's manuals and tools; c) to study the results of acceptance and use of eDLTV media technology for the learning of PDS.

III. Literature Review

A. eDLTV

In Thailand, the government has a policy for teachers to use eDLTV media to apply in the school's learning management system. In other words, it should be used as a tool for teaching and researching for the development of agencies involved in educational management. In this way, it will lead to concrete practice in promoting and enhancing the learning of Thailand. In response to the policy, National Science and Technology Development Agency (NSTDA), as the secretary for Information Technology Projects, has collaborated with 35 Rajabhat Universities to operate a network project to disseminate, transmit and develop teaching materials on e-learning systems or eDLTV media. In fact, this project has been carried out under the Royal Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn. Since then, Rajabhat Universities have been playing an important role as the central agency for disseminating, broadcasting and developing eDLTV media [1].

According to eDLTV dissemination and broadcasting results, many schools joined the network and requested copies of eDLTV media. Teachers, therefore, can use eDLTV as a teaching aid, learning resource, and a guideline for writing a plan of learning activities [11], [12]. Executives and education supervisors have promoted eDLTV media as a teaching medium and as a source for further study in the library and audiovisual rooms for students when teachers are in government service [13]. This research result is consistent with the study of Arreerard [14] 'A study on the use of eDLTV in teaching and learning' which revealed that the studied schools used eDLTV in 4 manners: teachers use it as a) a source of information to prepare their instruction; b) a supplementary media for teaching in the classroom; c) an additional learning source; d) an electronic copy for students and the public for further learning. This study also suggested that eDLTV is an innovation that has been accepted highly as a tool for teaching and learning. In another study by Woraphapa Arreerard [15], sample teachers suggested that universities should help teachers prepare the use of eDLTV media in school contexts based on the teacher's needs.

RMU is one of the agencies distributing the media. The university has cooperated with eDLTV media network schools in the Northeast of 13 provinces and three schools in the Information Technology for Education Project in rural areas, totaling 1,039 schools [15]. The university has conducted the research as academic services together with network schools to promote the use of eDLTV in teaching. The activity has been set in 6 steps: a) explaining guidelines; b) signing cooperation; c) using media in teaching and learning; d) developing electronic media; e) producing research reports; f) providing assistance, reviewing, and evaluating the performance. From the operational results, the network schools have developed school personnel as leaders or mentors to assist, monitor, and evaluate the performance of the project (at least 1-2 teachers in each school, a total of

1,570) [13]. Most school teachers use eDLTV for at least one week in teaching. From a survey of 2,075 participating teachers, 96.82% of teachers were satisfied with the dissemination of eDLTV. 85.06% have gained knowledge and understanding of the media to use eDLTV in the classroom. 91.08% were satisfied with the training organized by the university. As a result of the operations, as mentioned earlier, it has resulted in the dissemination of eDLTV media innovations in 2,075 schools in the cooperation network to achieve the goal [6].

Phongphaew [16] has researched the application of eDLTV to develop a collaborative learning application by using the Jigsaw technique. The research aims to train 24 teachers to use the application of eDLTV by using the Jigsaw technique. This helps teachers to be focused on learning and exchanging knowledge. The results showed that a) teacher training for applying eDLTV using the Jigsaw technique consisted of 4 components: three units of learning content, 16 learning objectives, five sets of evaluation measurement tools, and five sets of practice worksheets, and measurement and evaluation of operational skills. b) The trainees could apply eDLTV and create the applications. c) The overall satisfaction of the trainees with the training was rated at the highest level.

Kaewkanha, Arreerard, and Arreerard [17] have studied the teachers' acceptance of flipped classroom learning activity model by applying eDLTV and the TAM Technology Acceptance Model of 190 teachers under the Office of Secondary Education Service Area in 2015. The teachers' acceptance was at the highest level based on the statistical analysis. This is because they perceived the benefits and ease of using eDLTV.

B. PBL

Project-Based Learning (PBL) is one approach to organizing practical learning activities for learners to develop and integrate inter-collaborative skills in small groups as it is learning by using the knowledge they have to work on their assignment [18]. This is a way for learners to build their knowledge through interactions under their environment. However, the learners are different, and each learner can create a new body of knowledge by using current knowledge as a base [19]. PBL management can be organized into six steps: a) determining project; b) planning the project process; c) project implementation schedule; d) project completion under mentoring and supervision; e) preparation a report and presentation of the project results; f) evaluation of the process results and project results. Soparat, Rochanasmita, and Klaysom [20] proposed a four-step process for PBL activities: a) planning, b) creativity, c) reflection, and d) presentation. In this regard, Pidchapan, Arreerard, and Jansawang [21] (2020) conducted research 'The Model of Application of Embedded Technology for Developing STEM Computer Project (STEM is a teaching philosophy that integrates four disciplines: Sciences, Technology, Engineering, and Math into a single, cross-disciplinary program), and its results showed that the model has three components: a) educational management policy; b) learning activities; c) the application of embedded technology to develop computer projects according to STEM education in 6 steps, Step 1: open the learning world, Step 2: analysis of fundamental factors, Step 3: planning of operations, Step 4: creative action, Step 5: produce reports and manuals, and Step 6: continue learning. Experts' opinions on the model's suitability were at the highest level. The project assessment results showed that students satisfactorily showed project presentation skills. The work and the presentation of reports were at a good level. The portfolio or project work was rated between good and excellent levels. The assessment results of student learning behaviors in terms of 'creativity and innovation' were between 'good' and 'very good.' The students' satisfaction with the activities was at the highest level, and the mentors' satisfaction with the activities and guide as a whole was at the highest level.

C. Participation

Participation is a process for people to be involved in the operation, sharing ideas, making decisions, and solving problems by themselves, emphasizing personal involvement. The concept and process of participation included four issues [22]: a) comprehensive participation in creating opportunities that allow all members of the community and society to participate in activities leading to develop the development process and facilitate equal benefits; b) participation that reflects voluntary involvement and democracy is to facilitate development efforts, distribution of development benefits and goal setting decisions, policy and implementation planning; c) participation is a link between people and resources for development and investment benefits; and d) people's participation may vary according to a country's economic conditions, policies and administrative structure including socio-economic characteristics of the population. In this regard, the participation process is divided into four steps: planning participation, participation in practice, participation in the allocation of benefits, and participation in monitoring and evaluation [22], [23].

IV. Research Methodology

A. Research Procedure

The research procedure was carried out in 3 phases:

Phase 1: Develop a model of participatory eDLTV technology transfer to promote learning at PDS by using PBL activities- (1.1) conduct a study of contexts, problems, and needs of using eDLTV technology to promote learning at PDS by meeting school administrators and teachers who are responsible for computer classrooms at all PDS to create understanding and awareness of the use of eDLTV to promote learning, then conduct In-Depth Interviews, study context, problems, needs and guidelines of teachers in applying eDLTV in teaching and survey the readiness of the school's computer classroom. Then, there was a meeting of school administrators and teachers to set guidelines for applying eDLTV media technology to promote learning at their schools. (1.2) Use the information obtained from step 1.1 as a framework for drafting the model along with its description and manuals. After that, a small group meeting of school administrators and teachers (9 participants) was organized to consider the manuals for technology transfer of eDLTV media and the appropriateness of the model's

activities, procedures, manuals, and research tools. (1.3) Develop manuals and tools of the eDLTV technology transfer model and then present them to coordinative teachers, teachers, or computer lab administrators of 9 PDS (one from each school) for further improvement and correction. (1.4) Conduct a small group meeting of 9 experts with experience in eDLTV diffusion and broadcasting in schools and educational institutions to consider and evaluate the manuals and tools' suitability using a developed questionnaire. (1.5) Analyze and summarize the model development results and create the manuals and research tools as recommended.

Phase 2: Study the experimental results of using the manuals and tools of a participatory eDLTV technology transfer model to promote learning at PDS by using PBL activities. The research in this phase has been carried out as follows: (2.1) Organize the meeting of administrators, teachers, and computer lab administrators of PDS to present eDLTV media technology for teaching and learning and to ask them to participate in planning the technology transfer of eDLTV to promote the teaching and learning of PDS in Sisaket Province. (2.2) Try out the manuals and tools of the eDLTV technology transfer model with the group of administrators, teachers, and computer lab administrators of PDS. (2.3) Visit the sample schools to follow up the project implementation and advise teachers on how to use them in the school system, such as installing and experimenting with media according to the steps of the model. (2.4) Provide online consultation or on the phone for schools with network problems, supervise and monitor the use of eDLTV in teaching and learning management, provide advice and guidance to teachers in using PBL activities and media applications. (2.5) Ask for opinions of all stakeholders to collect data on the use of eDLTV in teaching, analyze and summarize the experimental results of the eDLTV technology transfer manual.

Phase 3: Study the results of acceptance and use of eDLTV media technology for learning of PDS teachers and students in Sisaket Province – (3.1) Organize the online teacher meetings to introduce the ways to write storytelling essays, make a video and apply eDLTV in teaching and learning for teachers and students. (3.2) Create the deadline for teachers and students to submit their essays and storytelling video, and then appoint a committee to review and evaluate their works. (3.3) Invite the Audit and Evaluation Committee to visit the school to monitor the implementation of eDLTV media technology in teaching and learning according to the context of each school and ask questions and reflections on learning outcomes in each school. (3.4) Organize a seminar to reflect the learning outcomes of using eDLTV media technology in teaching and learning PDS by allowing each school to present their activities in applying eDLTV media in learning for schools and teachers who are not participating in the study program. This also included asking for acceptance of eDLTV media technology and implementing eDLTV technology transfer manuals of PDS in Sisaket Province. (3.5) Collect data, analyze and summarize the participatory eDLTV technology transfer results to promote teaching and learning at PDS in Sisaket Province, and present them to relevant agencies.

B. Research Tools

Phase 1: The In-depth Interview form for school administrators and teachers was created to study the context, problems, and needs of using eDLTV media in teaching. Three experts evaluated its content variability and the Index of Consistency of 1.00.

Phase 2: The manuals and tools of the participatory eDLTV technology transfer model to promote teaching and learning at PDS were evaluated by nine experts using a 5-rating scale questionnaire probing their opinions on the model's suitability and the tools, created according to Likert's Approach. All three manuals have their suitability score at the highest level – (2.1) The manual for administrators of PDS contains the following contents: the importance of eDLTV in teaching and learning, preparing laboratories and classrooms for online and offline use of eDLTV, application of eDLTV media technology for teaching and learning, application of eDLTV in PBL, a record form for advising on the use of media in schools and a record form for the use of eDLTV in schools. (2.2) The manual for teachers of PDS contains the following contents: eDLTV media technology transfer, installation and use of eDLTV in online and offline formats, application of eDLTV in PBL, story essay writing, storytelling video production, a student's story essay assessment form, a suitability assessment form for teacher's video, a record form for advising on the use of media in schools and a record form for the implementation of eDLTV in schools, readiness preparation of PDS in Sisaket Province by preparing for the classroom, roles, and duties of supervising teachers in schools and a teacher's eDLTV learning evaluation form.

Phase 3: The 5-rating scale questionnaire on the acceptance of eDLTV media technology and the acceptance of the training activities is developed according to Likert's Approach. The confidence value from finding the alpha coefficient (α-Coefficient) is 0.81.

C. Variables

Independent Variable: Model and manuals of participatory eDLTV technology transfer to promote learning at PDS by using PBL activities

Dependent Variables:

1) Expert opinions on the suitability of the model and the manuals of participatory eDLTV technology transfer to promote learning at PDS by using PBL activities
2) Results of an experiment on user manuals and tools of the model of participatory eDLTV technology transfer to promote learning at PDS by using PBL activities
3) Acceptance and use of eDLTV media technology for teaching and learning of PDS teachers in Sisaket Province

D. Population and Samples

Group 1: The population were 119 administrators, teachers, coordinators, and administrators of computer labs at PDS in Sisaket Province, purposively selected as specific sample groups as follows: (1.1) 9 administrators of all nine schools, (1 from each school); (1.2) 63 teachers and computer lab administrators from 9 schools that participated in the project, (5-10 from each school); (1.3) 27 coordinators of all nine schools (3 from each school)

Group 2: There were 1,435 students (novices) of PDS in Sisaket Province (all nine schools). 956 of those were selected as the samples from the classrooms where teachers participated in the project (3 classrooms in each school, a total of 27 classrooms).

E. Statistics

The statistics used in the research were: Percentage (%), Mean ($\overline{X}$), and Standard Deviation (SD.). The mean values were compared with the assessment criteria as follows:

4.50 – 5.00 means 'highest level';
3.50 – 4.49 means 'high level';
2.50 – 3.49 means 'moderate level';
1.50 – 2.49 means 'low level';
1.01 – 1.49 means 'lowest level'.

V. Research Results

A. Development of a Model of Participatory eDLTV Technology Transfer to Promote LEARNING at PDS By using PBL Activities

The researcher researched to study the contexts, problems and needs to be used as a framework for drafting a model before presenting the model to experts to evaluate. The results of this operation are as follows:

1) From the study of the context, problems, and the need for the application of eDLTV media technology for teaching and learning of administrators and teachers of PDS in Sisaket Province by interviewing and surveying information from 119 administrators, teachers, coordinators, and administrators of computer labs of 9 PDS of which 36.97% were monks and 63.03% were laypeople. There were 1,435 students as novices and 227 computers. The average number of students per number of computers was one device for 6-7 students. Most of the school's problems are that a) the teachers were not educated in computers. b) Teachers have educational qualifications that do not match the subject taught. c) The number of teachers in the class does not match the classroom. d) On certain days, teachers who are monks cannot teach according to the monks' activities. As a result, the schools lacked teachers to teach. e) For the maintenance of computer labs, schools have inadequate teachers responsible for ensuring that the rooms are ready, with fewer computers and equipment available. f) Most internet networks (85%) are unstable.

Regarding the need for eDLTV application in teaching and learning, teachers are interested in using eDLTV in teaching, although they have never used eDLTV before. There is no readiness to use eDLTV in teaching and learning. Teachers wanted a mentor to guide the use of the media and wanted the media to be installed in a computer lab, classrooms, and learning libraries so that students and teachers could learn at any time. The quantitative data of the schools are shown in Table I.

From Table I, PDS in Sisaket Province have teachers, monks, and laypeople. All students are novices. Each school has a working computer with a different number and conditions.

2) Development of a model of participatory eDLTV technology transfer to promote learning at PDS by using PBL activities: the researcher has applied the principles and concepts of eDLTV technology transfer, contexts, problems, and needs of PDS in Sisaket Province to draft a model by emphasizing participatory operations to promote teaching and learning of PDS; then summarized the issues, and prepared a model and manuals of the model for teachers and administrators to use in organizing learning activities in schools. After that, the researcher has presented them to experts, administrators, and teachers to consider their suitability and then made improvements, as shown in Fig. 1 and Fig. 2. The experts' opinions on the suitability of the model and eDLTV technology transfer manuals are shown in Table II below.

TABLE I: Summary of the Number of Teachers, Students, and Computers in PDS in Sisaket Province

PDS[1]	Teachers			Student	Computer
	Monks	Layperson	Total		
PDS1	10	12	22	279	41
PDS2	4	8	12	161	20
PDS3	5	5	10	156	15
PDS4	6	11	17	90	17
PDS5	6	7	13	189	30
PDS6	5	8	13	222	8
PDS7	4	7	11	130	40
PDS8	2	9	11	112	16
PDS9	2	8	10	96	41
Total	**44**	**75**	**119**	**1435**	**227**

[1]PDS1: Sri Kaset Wittaya School; PDS2: Kiatkaew Wittaya School; PDS3: Kantharalak Thamwit Wat Krabi School; PDS4: Phra Pariyatithammasaman School Ban Non Temple; PDS5: Phosri Wittaya School; PDS6: Wat Sa Kamphaeng Yai School; PDS7: Wat Pracha Nimit Sophit Thammaphan School; PDS8: Prangku Wittaya School; PDS9: Duan Yai Wittaya School

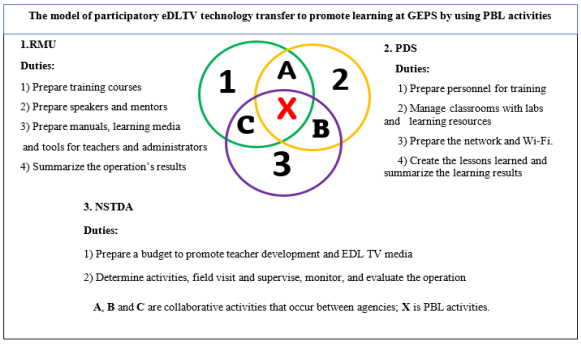

Fig. 1. Participation of agencies in eDLTV technology transfer to promote learning at PDS by using PBL activities.

From Fig. 1, participation of the agencies in eDLTV technology transfer to promote learning at PDS is an activity created under the cooperation of three agencies: RMU, PDS, and NSTDA (National Science and Technology Development Agency). All three agencies have specific duties and activities that must be carried out to encourage PDS teachers to apply eDLTV media in teaching to enhance and promote students' learning in PDS.

From Fig. 2, the model has three sets of media and manuals for administrators, teachers, and students and 7 step activities: a) Learn eDLTV media and its applications; b) Specify subjects of learning activity; c) Study and research from

eDLTV; d) Design projects to implement; e) Follow up results; f) Summarize the results of storytelling, and g) Presenting the results to exchange knowledge. The tools for measuring and evaluating the learning outcomes of teachers and students are an evaluation form of the teacher's learning from eDLTV, and a student projects' evaluation form.

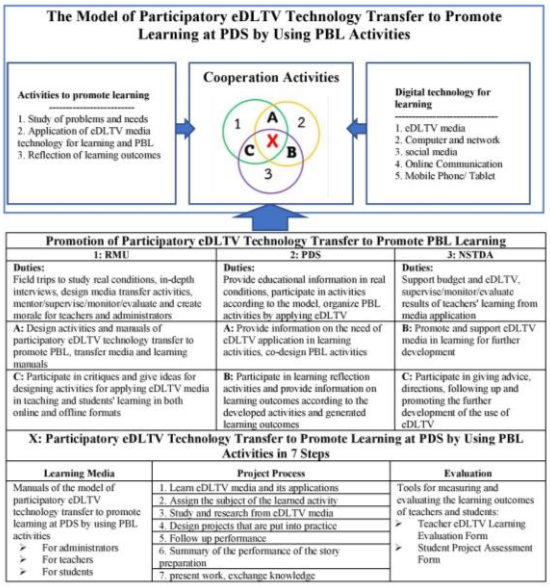

Fig. 2. Model of participatory eDLTV technology transfer to promote learning at PDS by using PBL activities.

TABLE II: EXPERTS' OPINIONS ON SUITABILITY OF THE MODEL

Suitability	Level of Suitability X	SD.	Level
1. Activities to promote learning	**4.63**	**0.56**	**Highest**
1.1Study of problems and needs	4.78	0.44	Highest
1.2 Application of eDLTV and PBL for learning	4.67	0.50	Highest
1.3 Reflection on learning	4.44	0.73	High
2. Digital technology for learning	**4.64**	**0.57**	**Highest**
2.1 eDLTV	4.89	0.33	Highest
2.2 Computer and Network	4.56	0.73	Highest
2.3 Online Social Media	4.78	0.44	Highest
2.4 Online Communication	4.67	0.50	Highest
2.5 Mobile Phone/ Tablet	4.33	0.71	High
3. Cooperation activities	**4.89**	**0.32**	**Highest**
1: RMU	**4.78**	**0.42**	**Highest**
Duties: Field trips to study actual conditions, conduct in-depth interviews, design media transfer activities, mentor/supervise/monitor/evaluate/create morale for teachers and administrators	4.67	0.50	Highest
A: Design activities and manuals of participatory eDLTV technology transfer to promote PBL, transfer media, and learning manuals	4.78	0.44	Highest
C: Participate in critiques and give ideas for designing activities for applying eDLTV media in teaching and students' learning in both online and offline formats	4.89	0.33	Highest
2: PDS	**5.00**	**0.00**	**Highest**
Duties: Provide educational information in actual conditions, participate in activities according to the model, organize PBL activities by applying eDLTV	5.00	0.00	Highest
A: Provide information on the needs of eDLTV application in learning activities, co-design PBL activities	5.00	0.00	Highest
B: Participate in learning reflection activities and provide information on learning outcomes according to the developed activities and generated learning outcomes	5.00	0.00	Highest
3: NSTDA	**4.94**	**0.24**	**Highest**
Duties: Support budget and eDLTV media, supervise/monitor/evaluate results of teachers' learning from the media application	4.78	0.44	Highest
B: Promote and support eDLTV media in learning for further development	5.00	0.00	Highest
C: Participate in giving advice directions, following up, and promoting the further development of the use of eDLTV	4.89	0.33	Highest
4. Contextual Suitability and Conformity	**4.93**	**0.25**	**Highest**
4.1 The model is consistent with the contexts of PDS.	4.78	0.44	Highest
4.2 The model is consistent with the technology age for teachers and students.	4.89	0.33	Highest
4.3 The model is modern to promote teacher learning.	5.00	0.00	Highest
4.4 The model's tools are appropriate for teachers and administrators to implement.	5.00	0.00	Highest
4.5 The model tools can be applied in the context of PDS.	5.00	0.00	Highest
5. Suitability of project activities, activity manuals, assessment, and measurement tools	**4.93**	**0.25**	**Highest**
5.1 Step-by-step description	4.89	0.33	Highest
5.2 Easy and convenient use	4.78	0.44	Highest
5.3 The PBL process is appropriate for the context of the learners.	5.00	0.00	Highest
5.4 Learning activities and project implementation are explicit.	5.00	0.00	Highest
5.5 Evaluation of the project per the implementation	5.00	0.00	Highest
5.6 Executive Manual	4.89	0.33	Highest
5.7 Teacher Manual	4.78	0.44	Highest
5.8 Student Manual	4.89	0.43	Highest
5.9 Learning Measurement and Evaluation Tools: Teacher eDLTV Learning Assessment Form	5.00	0.00	Highest
5.10 Learning Measurement and Evaluation Tool: Student Project Assessment Form	5.00	0.00	Highest
Total	**4.83**	**0.41**	**Highest**

From Table II, experts' opinions on the appropriateness of the model and its tools were at the highest level. All listed items were rated at the highest level, ranging from the suitability of project activities and manuals, contextual suitability and conformity, cooperation activities, digital technology for learning, and activities to promote learning. The suitability of project activities and activity manuals was at the highest level: PBL process is appropriate for the context of learners; learning activities and project implementation are explicit; evaluation of the project by an implementation; detailed description; easy and convenient

use. Even if it is sporadic to see many 5.00 agreement scores in the study, this may result from the collaboration of three agencies: RMU, PDS, and NSTDA to develop the project together, which might affect the experts' opinion on the model.

B. Experiment on User Manuals and Tools of the Model of Participatory eDLTV Technology Transfer to Promote Learning at PDS by Using PBL Activities

The researcher has developed the model's tools by creating manuals for administrators, teachers, and students. Then they were tested with a sample group according to the model's activity guide to follow the teaching-learning cycle in each semester. The total trial period is 120 days (Phase 1, 10 days; Phase 2, 90 days, Phase 3, 20 days), as shown in Table III.

TABLE III: EXPERIMENTAL ACTIVITIES, MANUALS, AND TOOLS

Operational activities	Activities, duration, and target groups	Venue
Phase 1 Study of problems and needs, (10 days)		
Activity 1: Preparation of the school, administrators, and supervising teachers	One day training, (33 Trainees included 15 administrators and 18 teachers)	Sri Kaset Wittaya School
1) Study the context and needs of teachers.	Visit the site for nine days (One-day per school).	9 PDS
2) Provide consultation, advice, laboratory preparation, preparation for learning, building understanding through online systems	Online network, 33 participants (15 administrators and 18 teachers)	Online networking system: Line group and Facebook
Phase 2, application of digital technology eDLTV for learning with PBL activities, 90 days		
Activity 2. Workshops on four topics as follows: (1) Operate eDLTV media; (2) Application of eDLTV for learning; (3) Scriptwriting and digital narrative; (4) PBL and application of eDLTV in PBL	Three days training, 88 Participants (31 monks and 57 laymen)	Language and Computing Center, Sisaket Rajabhat University
Activity 3: Putting it into practice in the classroom and visit the area to advise each school by having students present a 7-step PBL activity	85 days for giving advice (2 days per school, three times each)	School laboratories (9 PDS)
Phase 3: Reflection, 20 days		
Activity 4: Workshop and Summary preparation-3 topics: (1) School management summary video; (2) Empirical works of teachers, a summary of lessons on using eDLTV media in teaching; (3) Writing an essay on a student's story	Two days of training and 15 days practice to make presentations (88 participants, including 31 monks and 57 layperson teachers)	Sri Kaset Wittaya School, (9 PDS)
Activity 5: Developing work for publicity-3 topics: (1) Examination of the work of writing stories of novice students; (2) Examination of the video summary of the teacher's activities; (3) Presentation of teacher and student work to the committee to select empirical works and the student's story articles to be awarded	Two days training and 1-day presentation, (1,080 participants, including Nine administrators, 27 teachers, 27 coordinators and 956 students)	Sri Kaset Wittaya School

Activity 1: **School preparation** was conducted by meeting school administrators and supervising teachers to understand and plan the operations, including supervision, follow-up, and evaluation (1 day). The meeting was organized into two groups as follows:

Group 1: School Administrators, the meeting of 15 school administrators reached the following agreement: a) administrators and supervising teachers will be in charge of management and coordination of teachers in their schools, including supervision, following up, and reporting the results to the university; they will be the coordinator to organize activities as agreed in cooperation; b) the university determines training activities according to requirements of the Information Technology Foundation, and notifies to the leading teacher network group; c) the schools must be ready to receive supervision, following up, and cooperate in surveying or receiving advice from the university.

Group 2: Supervising teachers, the schools must send teachers to attend the meeting of the leading teachers (both monks and layperson teachers) to be a mentor and coordinator (2 persons per school, total 18), to train other supervising teachers to become a mentor teacher and coordinator of the schools with an understanding of activities in using eDLTV online and offline, copying or duplicating eDLTV and eDLTV media sharing. After asking the opinions of the supervising teachers, all the informants were satisfied with the above activities at the highest level.

Activity 2: Workshop, the two-day training was organized for teachers of PDS in Sisaket Province to give them knowledge and understanding in applying eDLTV in teaching and learning, making a video presenting stories about learning activities from learning activities eDLTV media. The results of organizing the training for 88 participants from 9 schools (31 monks, 57 laypeople, and eight speakers, and the proportion of assistant speakers to teachers who attended the training were 1: 10) are that the content of the training focused on demonstration and practice in 3 topics: a) eDLTV operation; b) application of eDLTV for learning; c) scriptwriting and digital storytelling; d) PBL and application of eDLTV in PBL. After the training, all the participants were satisfied with the activities at a high level as they were able to perform activities in using eDLTV media according to the worksheet, have knowledge and understanding, can transfer the use of eDLTV media, write scripts, conduct stories, learn from eDLTV media, able to transfer PBL and apply eDLTV in PBL to their school teachers.

Activity 3: Putting it into practice in the classroom and visiting the schools to advise each school, researchers, trainers, and assistants visited each school to give advice. This was organized into three groups: 2 persons each in 2 days to visit the school site to provide advice and assistance in installing equipment and eDLTV media, application of media, searching and teaching the practice with lesson plans developed by teachers during the training. In this activity, it was found that teachers, mentors, and coordinators were able to teach by applying eDLTV media in PBL activities appropriately, and they can be an example of a leader in implementing eDLTV in PBL at school.

Activity 4: Workshop and Summary Preparation is an

activity that continues after the training to advise the LINE network and Facebook, including school visits to schools for three days to manage training and consultation on both operation and training performance results. There were 88 participants from 9 schools (31 monks and 57 layperson teachers, two trainers, and ten assistants). The training content focuses on practice and provides advice on improving the script content and individual video making methods in 3 topics: a) School management summary video; b) Empirical works of teachers, a summary of lessons on using eDLTV media in teaching; c) Writing an essay on a student's story, training activities, presentation of samples of practice and presentation of an example that the trainees have practiced, along with checking the appropriate format by analyzing and synthesizing guidelines from the implementation of teachers and school administrators leading to conclusions and writing scripts to review and check the work done by individual teachers.

Activity 5: Developing work for publicity; this is the last activity that summarizes empirical results and promotes further development by organizing three days-activities. There were 114 participants from 9 schools (31 monks and 57 layperson teachers, two trainers, and 19 assistants). The proportion of assistant trainers to teachers who attended the training was 1: 5 because it is a practice of writing an essay, making a storytelling video, giving individual advice, and making individual improvements. The first-day training focused on examining the work of writing script and narratives by a guest speaker to improve articles on the story of novice students. Day 2 focused on examining the video works of teachers and schools by giving advice and improving them individually. On the last day, the student's story articles were presented to the Board of Directors from the Office of Buddhism in Sisaket Province to be selected and awarded as empirical works. In this activity, the Board of Directors acted as the chairman of the Opening Ceremony and presented the awards to teachers and students. The opinions of 114 teachers on an experiment of the model' manuals and learning materials are shown in Table IV.

TABLE IV: TEACHERS' OPINIONS ON THE MODEL'S MANUALS AND LEARNING MATERIALS

List	Level of Suitability		
	X	SD.	Level
1. Usefulness of the model and manuals	**4.69**	**0.46**	Highest
1) PBL promotion activities	4.93	0.26	Highest
2) Digital technology for learning	4.52	0.50	Highest
3) Collaborative activities to promote learning	4.85	0.36	Highest
4) Consistency with the context of PDS	4.65	0.48	Highest
4.1) The model is consistent with the context of PDS	4.30	0.46	High
4.2) The model is consistent with the technology age in learning for teachers and students.	4.18	0.39	High
4.3) The model is modern to promote teacher learning.	4.96	0.21	Highest
4.4) The model's tools are appropriate for teachers and administrators to implement.	4.88	0.33	Highest
4.5) The model tools can be applied in the context of PDS.	4.91	0.28	Highest
2. The usability aspect of manuals and learning activities	**4.81**	**0.39**	**Highest**
2.1 Step-by-step description	4.82	0.39	Highest
2.2 Easy and convenient use	4.73	0.45	Highest
2.3 Clarity of illustration	4.86	0.35	Highest
2.4 Clarity of learning and practical activities	4.79	0.41	Highest
2.5 Suitability for viewing online and in book form	4.87	0.34	Highest
Total	**4.74**	**0.44**	**Highest**

From Table IV, the overall teachers' opinion towards the suitability of the manuals and learning materials of the model was at the highest level. Both studied aspects were appropriate at the highest level. The manuals and learning activities' suitability was also rated at the highest level. The usefulness of the manuals and consistency of the model with the learning technology age for teachers and students showed the lowest assessment results.

C. Acceptance and Use of eDLTV Media Technology for Learning by PDS

After trying out the model's learning activity tools and Phase 2 field trip, the researcher has collected data from the eDLTV media use record form in schools, essays, and storytelling videos of administrators, teachers, and students, and from the eDLTV technology adoption questionnaire of participating teachers and administrators. The data are analyzed as shown in Table V.

From Table V, 88 teachers (100%) reflected their learning outcomes and answered a questionnaire. As shown in Fig. 3, the reasons for accepting the use of eDLTV media of teachers consisted of 4 aspects, in order from the most, which were Aspect 4: Research (72, 81.82 %); Aspect 2: Indirect Educational Background (31, 35.23%); Aspect 1: Shortage of Teachers (15, 17.05%); Aspect 3: Teachers' Unskillfulness (8, 9.09%).

TABLE V: ACCEPTANCE AND ADAPTATION OF EDLTV MEDIA IN PBL

No.	School	Participants	Reasons to use eDLTV in PBL			
			Aspect 1	Aspect 2	Aspect 3	Aspect 4
1	PDS2	9	-	4	-	9
2	PDS1	15	3	1	-	11
3	PDS5	12	-	-	-	12
4	PDS8	7	-	1	2	7
5	PDS3	9	2	3	-	5
6	PDS7	8	4	5	5	7
7	PDS9	8	2	4	1	8
8	PDS4	10	4	7	-	3
9	PDS6	10	-	6	-	10
Total		**88**	**15**	**31**	**8**	**72**
%			**17.05**	**35.23**	**9.09**	**81.82**

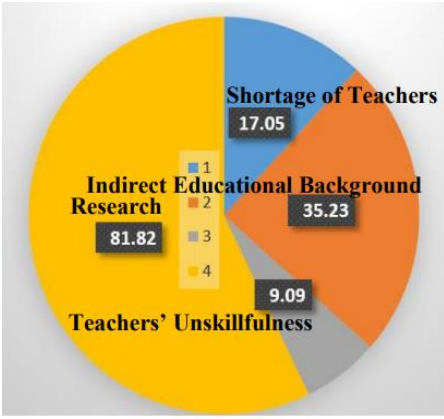

Fig. 3. Factors for making decision to use eDLTV in PBL.

From Table VI, the examples of PBL activities of teachers who received awards from their presentations selected by committees from 3 cooperative agencies. It is the selection of the work of teachers in each school in organizing PBL activities by applying eDLTV as a learning medium, one outstanding project per school for an incentive award from the Information Technology Foundation under the Royal Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn, a total of 9 awards.

TABLE VI: EXAMPLES OF AWARDED PBL ACTIVITIES OF TEACHER

No.	School	Titles	Learning Area
1	PDS5	Organic vegetable cultivation	Career and Technology
2	PDS2	English: 'My Body'	Foreign language
3	PDS1	Information Technology	Career and Technology
4	PDS7	English from Electronic Media	Foreign language
5	PDS9	Elements and Compounds	Science
6	PDS4	Creation of Print and Electronic Media from eDLTV	Information technology
7	PDS8	Fun Math Media	Mathematics
8	PDS3	Pha Mor E Daeng History	Social studies, Religion and Culture
9	PDS6	Creation of Print and Electronic Media from eDLTV	Information technology

VI. CONCLUSION

The research on the participatory eDLTV technology transfer model to promote learning at PDS by using PBL activities leads to the participatory activities of the relevant agencies in organizing training and developing activities for teachers and mentoring and becoming a mentor, and giving advice both online and on-site. This allows teachers to use the model of teaching or learning activities of students as a project and results in teachers having to define learning topics from media in the form of activities about the contexts and search for learning materials in 7-step project work - a project that teachers join with students in co-learning in 120 days. Using the model and its manuals, the teachers have obtained the project from participatory learning as a learning strategy and practice using eDLTV media. Teachers' opinions on the experimental model from 114 teachers on the suitability of the learning activities were at the highest level. Also, from the reflection on the learning outcomes from 88 teachers at PDS, all teachers (100%) thoroughly applied eDLTV media in PBL in various subjects after the training. The reasons for the use of eDLTV media for teachers consisted of 4 aspects: Research (81.82%); Indirect Educational Background (35.23%); Shortage of Teachers (17.05%); Teachers' Unskillfulness (9.09%). It can be seen that this research helps enhance teacher learning and teaching development as they can use eDLTV to aid their pedagogical processes. As a result, it helps to solve the problem of teacher shortage. It also allows schools, teachers, and students to use eDLTV for learning by using PBL activities to learn, seek more information, or conduct research on eDLTV and apply them in teaching and learning projects. As a result, the development of teachers is encouraged to enhance learners' learning by using eDLTV as a learning tool. Teachers and students became more confident in organizing activities using eDLTV and ICT through the network with a mentor under cooperation than in the past.

VII. SUGGESTION

The subsequent research should be done to develop the knowledge and skills of teachers and students in using digital media and information technology in teaching by developing learning skills and using learning materials. However, the schools must have internet network stability and speed. This will increase the learning outcome and meet with usage needs of teachers and students. In addition, eDLTV media can be learned online through the website: http://edltv.thai.net. Its current content includes learning content through the eDLTV system, taught at all levels according to the specified schedule. If the network is efficiently accessible, learning through online channels will solve the problems such as the shortage of teachers in PDS. Finally, based on the significance of eDLTV media consisting of 4 internal systems: eDLTV for Primary School; eDLTV for Secondary School; eDLTV for Vocational Development and eDLRU System, this makes it ready to use in different types of education so that the subsequent research on eDLTV media should be expanded to other types of education such as education for the disability or the deaf to test the generalization of the research results.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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