

A Synthesis of a Model for enhance Creative Thinking Using Problem-based Learning and Pairs Learning Method with Scaffolding System

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Abstract— The objective of this research is to synthesize the model for enhancing creative thinking using the problem-based learning and pairs learning method with scaffolding system via computer network (PBLPSC) to be used in setting the model in developing the learning via computer network in Electronic Learning Development course for the students of Computer Education Program, Rajabhat Rajanagarindra University by using Focus Group Discussion from 13 experts. Specification of expert group, researcher has defined qualifications of experts as follow; being an expert in Computer Education or Online Learning or Creative Thinking and having teaching responsibility in university or having working experience for five years or more. Expert selection in conducted by the specific method the second semester of 2016 Academic Year. The research results reveal that the learning model of PBLPSC consists of 7 components; 1) Teacher Module, 2) Content Module, 3) Student Module, 4) PBLPS Learning Module, 5) Communication Module, 6) Creative Thinking & Activity Module, and 7) Assessment Module. The results of evaluation on the appropriateness of teaching style reveal that the experts admit the proposed teaching style at high level (Mean = 4.40, SD. = 0.68). It can be summarized that such model can be applied as the prototype in developing the learning model of PBLPSC further.

Index Terms—PBL, pair learning method, scaffolding, creative thinking

I. INTRODUCTION

According to Section 24 of the National Education Act, B.E.2542 (1999), the educational institutes and related agencies are required to have the skill practice, thinking process, management, situation encountering, and application of knowledge to prevent and solve the problems. The practice is required to be able to do, think, love reading, and continuously learn for encouraging the instructors in providing the learning atmosphere, environment, learning media, and facilitating the learners to learn and be knowledgeable [1]. Developing learners with important and essential skills in living in the 21st century results in the changes in economy, society, and culture, politics as well as the way of life of people

around the world. The learners need to practice important skills in order to live happily in the society [2] and to use the full potential in performing the duties and create benefits to the society based on the learning framework in the 21st century focusing on 3 skills; skills in learning and innovation, skills in the information, media, and technology, skills in life and career. One of the skills in learning and innovation is Creative Thinking. In addition, Thailand currently has 3.0 education system which is the society of knowledge. The learners must have the skills in learning, have a variety of learning sources, uniquely create work including be able to work in team [3]. In the future, Thailand will develop the 4.0 education system with the goal of raising the quality of education, building up the desired learners, and supporting thinking, innovating and being self-dependent in technology focusing on producing people for generating innovation. [4] Therefore, the present instructors need to design the instructional formats that will develop different types of thinking skills to the learners. This research focuses on enhancing creativity for learners which will allow them to continue innovating.

The researcher conducts the data survey in 3 aspects as follows; 1) the opinions of 6 experts who teach in the field of Computer Education Program, Faculty of Education, Rajabhat Rajanagarindra University. The experts comment that the students have creativity at a moderate level, 2) test the creativities of students by purposive sampling to test the creativity of 30 students in the field of Computer Education by using the creativity test, Torrance Tests Creative Thinking: Figural Form A, which Aree Phanmanee adjusted into Thai language consisting of 3 activities; the 1st activity is to picture construction by 10 minutes, the 2nd activity is to complete drawing by 10 minutes, and the 3rd activity is to add pictures from parallel lines by minutes [5]. The test reveals that the creativity of the majority of learners (56.67 percent have the lowest to moderate standard T-score. This corresponds to the expert's opinions, and 3) the researcher collects the data by interviewing 5 students in the field of Computer Education performing the teaching in the educational institutes. The problem is found that the teaching style in the schools is different from learning in the universities causing the students to

feel that they have burdens and have to begin studying the data newly. There is also the problem in time and classroom management. From the observation, it is found that the university students often have the problem solving methods as previously and it is the thinking in the frame following the rules and regulations, lack of various thinking. In the real life, some problems cannot be solved by using the same methods. For these problems, if the learners have practiced the skills in thinking variously, problem solving, and use creativity, the learners can develop their professional performance consistently as well as increasing the potential for themselves.

From such reasons, the researcher develops the learning model focusing on the development of the learner's thinking process using the problem-based learning model as a stimulus for learner's learning and arranging the activities for learners to have Divergent Thinking in order to increase the creativity and view the problems in every aspect by using techniques such as brainstorming, six-hat thinking, mind diagram, logical thinking, development on a creative reading skill, a creative listening skill, a creative writing skill, etc. [6]. Setting up pairs learning methods can practice collaborative working and thinking to help reducing the pressure, have the chance to express, and enhancing the learner's potential in the content, knowledge in various subjects, and creative training.

II. RESEARCH OBJECTIVES

The aim of this study are to synthesize of the Model for enhance Creative Thinking using Problem-based Learning and Pairs Learning Method with Scaffolding System via Computer Network by study the documents and researches related. Survey data and analytical information with statistics.

Evaluate of the Model from the 13 expert's opinions with focus group method. Furthermore, we will analyze course, create teaching plan and organize learning activities for enhance creative thinking using PBLPSC learning model. Each step is evaluated on the appropriateness from experts group.

III. RESEARCH SCOPE

1) The population used in the study and evaluation of learning model consists of the experts in higher education having experience in developing teaching styles by arranging the learning via computer network and creative thinking.

2) The sample group used in the study and evaluation of learning model consists of 13 experts having teaching responsibility in university and having expert in Computer Education or Online Learning or Creative Thinking. The experts 1) having working experience for

five years or more and 2) have doctoral degree or at least have academic position not lower than the assistant professor.

IV. RESEARCH METHODOLOGIES

Research for the synthesis of PBLPSC learning model is divided into two phases as follows:

1st Phase: Design of PBLPSC learning model with the following processes:

1) Study the documents and researches related to creative thinking, problem-based learning, pairs learning method, enhancing efficiency to learners and learning through computer networks.

2) Explore the information about creative thinking of the learners in 3 aspects; 1) the opinions of the experts who teach in the field of Computer Education, 2) test the creativities of 30 students by using Torrance Tests Creative Thinking: Figural Form A), and 3) interview the problems of students of Computer Education encountering while teaching in educational institutes.

3) Design PBLPSC learning model based on the data survey, study, analysis, synthesis of data from documents and related researches.

4) Present the PBLPSC learning model to the advisor for reviewing and improving.

5) Create a tool for assessing the appropriateness of PBLPSC learning model

2nd Phase: Evaluation on the appropriateness of PBLPSC learning model has the processes as follows:

1) Propose the PBLPSC learning model developed by the researcher to 13 experts for evaluating the appropriateness by using Focus Group Discussion

2) Apply the experts' comments and suggestions from the Focus Group Discussion to improve and modify.

3) Publicize the PBLPSC learning model and apply it in the learning design via computer network on Electronic Learning Development Course.

V. RESEARCH RESULTS

According to the synthesis of PBLPSC learning model, the research results are divided into 2 parts as follows:

Part 1 PBLPSC learning model obtained from the data survey, study, analysis, and synthesis of data from the documents and researches as shown in Fig. 1 consisting of 7 components as follows:

1) Teacher Module: to store the data of teachers, who is authorized to add the content of the lessons such as course syllabus, contents, teaching materials, student evaluation, grading, student activities verification,

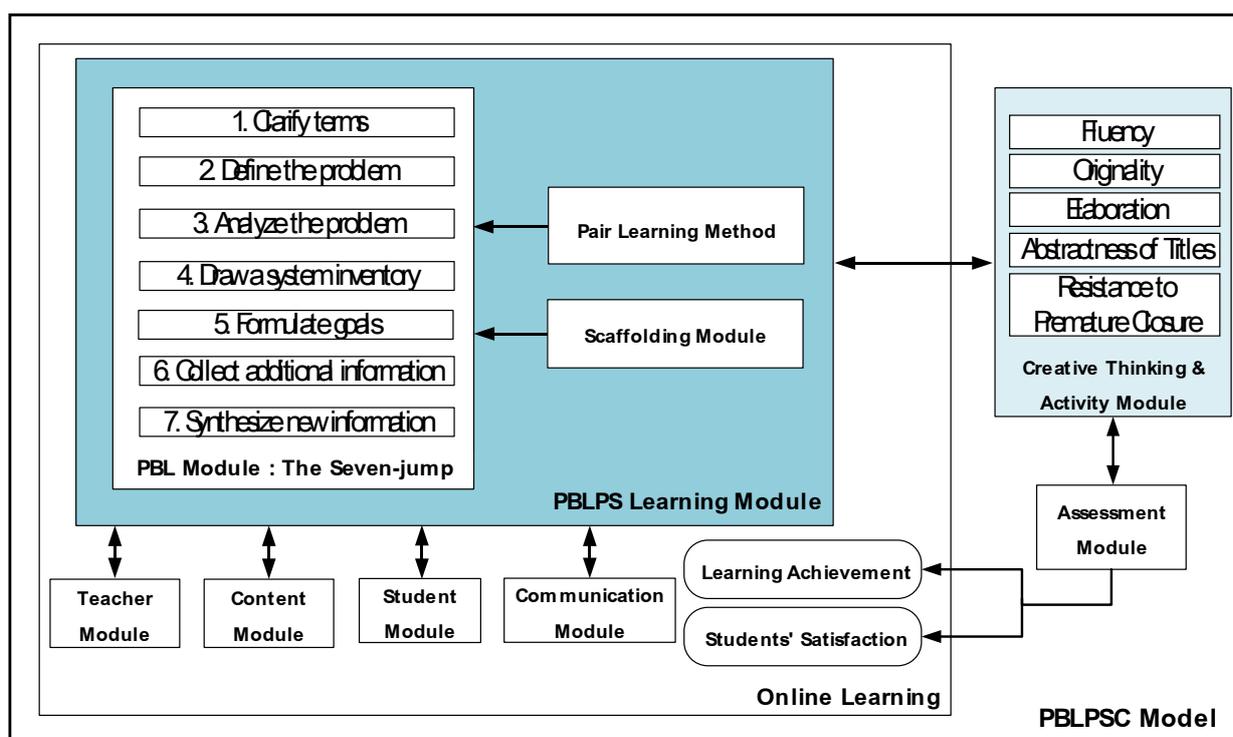


Figure 1. PBLPSC Learning Model

answering questions, check homework and talking to students.

2) Content Module: to store the contents of lessons, assignments, activities, documents, and educational sources to support the study for the learners.

3) Student Module: to store the enrolling students, data of learning activities of each learner, data of evaluation, and student's progress

4) PBLPS Learning Module consists of 3 main components as follows:

4.1 Problem-based Learning Module to prepare the teaching corresponding with the Seven-jump Model developed by Maastricht University. It is the model used in designing the problem-based learning process at earlier stage until now. It is acceptable widely [7] consisting on the following 7 steps:

4.1.1 Clarify terms and concepts in the problem description unknown to you: This is the first step in understanding the vocabularies and thinking on the unknown problems. If there is any vocabulary or thinking which is still not understood by the learner, the clear explanation is needed for clearly understanding.

4.1.2 Define the problem: This is the step in identifying the problem from the questions raised to know what is the problem required to be answered. The members of the group have to understand the problems consistently.

4.1.3 Analyze the problem: The third step is that the group members have to brainstorm for helping in analyzing the problems and finding the reasons to explain the problems by using the knowledge and experience in thinking and trying to explain the problems reasonably

leading to the assumption to be used as guidelines in finding the answers.

4.1.4 Draw a systematic inventory of the explanations inferred from step 4.1.3: After having analyzed the problems and set the assumptions, the next step is to prioritize the assumptions by using the existing knowledge and experiences of the group to consider and find the solution of the assumptions to be used as the guidelines in finding the answers further.

4.1.5 Formulate learning goals: The next step is that the group has to create or define the learning objectives to be used as the goal in finding the answers of the problem.

4.1.6 Collect additional information outside the group: This is the step of attempt of each member in studying and collecting the data to fulfill the knowledge and experiences from the data sources independently from the texts, documents, internet network, VDO, study trips, and exhibitions including communicating with the experts.

4.1.7 Synthesize and test the newly acquired information: This is the last step in sharing the discovery of new information among the members in the group in order to discuss altogether on the consistency of the obtained information and the defined problems under the objectives and assumptions. If it is found that the information which each member has researched can answer the questions perfectly, the results can be summarized for presenting the report. However, if it is unclear or does not cover the set problem issues, additional information is required to be found. The learning processes following this model will end in this step.

4.2 Pair Learning Method is to arrange the learners in pair of intelligent and poor by using the Matching Method following the learning effectiveness [8] in each subject relevant from the previous semester divided into 2 different groups. Then, the learners will choose the group freely [9] in order not to make the learners feel that they are forced. They must rely on, be friendly, and willing to learn with their pair. Pairing here can lead to the studying effectiveness and creative thinking of learners following the policy of environmental management facilitating the study of the learners as well as enhancing the potential of learners in using the teaching technics to support the cooperative learning in order to let the learners have chance to talk, exchange, analyze, synthesize, and summarize the information to create the performance as assigned.

4.3 Scaffolding Module: to enhance the potential in learning of the learners to be beyond the Zone of Proximal Development (ZPD) according to the concept of Lev Vygotsky [10] for example, giving suggestions, ideas, alternatives, assistance, and information to reduce the repetitiveness of problems in order that learners can solve the problems on their own as well as knowing how to creatively thinking such as practicing in thinking initiatively and carefully as well as having the imagination in naming the picture and not surrendering to the problems or delay in making decision to solve the problems.

5) Communication Module: to facilitate the communicative channels via computer and internet network such as online conversation, social online, computer and internet such as online conversation, online society, web conference, Q&A, notifications, news, e-mail, etc.

6) Creative Thinking and Activity Module: to arrange the learning activities to promote the creative thinking by using various technics in brainstorming, raising questions and answering of What-if (What would happen if), thinking technic of 6 hats, idea diagram, learning out of classroom, online classrooms, induction, etc.

7) Assessment Module: to evaluate in 3 aspects; 1) learning result evaluation from knowledge and understanding, thinking process, practices, group process and group performance, 2) student's satisfaction, and 3) evaluation on the Creative Thinking by using the TTCT.

Part 2: Results of evaluation on the appropriateness of PBLPSC learning model from 13 experts

TABLE I. THE RESULTS OF EVALUATION ON THE APPROPRIATENESS OF PBLPSC LEARNING MODEL

The appropriateness of the PBLPSC model	Mean	S.D.	Interpretation
1. Teacher Module	4.46	0.66	High
2. Content Module	4.46	0.66	High
3. Student Module	4.38	0.65	High
4. PBL Module	4.53	0.64	Highly
5. Pair Learning Method	4.23	0.93	High

The appropriateness of the PBLPSC model	Mean	S.D.	Interpretation
6. Scaffolding Module	4.38	0.77	High
7. PBLPS Module	4.38	0.65	High
8. Communication Module	4.31	0.85	High
9. Creative Thinking & Activity Module Learning	4.23	0.60	High
10. Assessment	4.46	0.78	High
11. Overall of the model	4.23	0.60	High
12. Apply to use	4.00	0.58	High
Total	4.40	0.68	High

According to Table I, the results of evaluation on the appropriateness of PBLPSC learning model is in the high level (Mean = 4.40, S.D.=0.68) and the appropriateness of problem-based learning module is in the highest level (Mean = 4.53, S.D.=0.64).

VI. RESEARCH CONCLUSION

The synthesis of learning model needs to encourage the learners to have more creative thinking in order that the let the learners have various and better problem solutions. Therefore, it requires the teaching methods and arrangement of teaching activities which are various and affect the thinking processes as follows; 1) problem-based learning to stimulate the learners to be curious and lead to the Seven-jump Method that the learners can solve the assigned problems. [11] During the learning process of PBL, the learners will be assisted to reduce the pressure from the learning elements of PBLPSC learning model. Moreover, in arranging 7 steps of activities, the learning technics have to be used for promoting proper creative thinking, 2) pair learning can reduce the pressure of learning alone as well as interacting with the pair friend in order to know how to work in team [12]. This can create the various thinking better than learning alone, [13] 3) in enhancing the potential to the learners, the learners requiring the assistance can improve themselves by working continually and friendly. The learners are encouraged to learn happily and enthusiastically in the assigned works [14], and 4) to measure the creative thinking, it requires the standardized tools by measuring both before and after using the PBLPSC learning model together with online activity arrangement [15][16] to enhance the learners in thinking creatively along with learning the contents.

In additional, the experts also suggest that in applying to teaching and learning, the topics should be included to be taught through the computer network and have a clear effect on creativity. As every topic in a particular subject cannot be taught via computer network and the activities to promote creativity must be the activities allowing learners to interact with those activities.

According to the results of evaluation in the appropriateness of PBLPSC learning models from 13 experts, the Focus Group Discussion has the approval to

accept the PBLPSC learning methods which the researcher has developed and use to experiment the real teaching further.

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