



## Learning Management Guidelines to Enhance Creative Problem Solving of Pre-Service Teachers

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### Abstract

This research aimed to study learning management guideline to enhance creative problem solving of pre-service teachers. There were two phases of the study. First, the researcher analyzed the related documents: researches, books and five Specialists. Research instruments were component synthesis form and suitability assessment form. Second, the fieldwork was applied for authentic study: three academics were Chulalongkorn University, Suan Sunandha Rajabhat University, and Lamplaimat Pattana School. Research instruments were teaching activities, observation form, interview form, relations analysis form and suitability assessment form. The results showed that: The components for creative problem solving of pre-service teachers consisted of five components; (1) fact finding, (2) problem finding, (3) idea finding, (4) solution finding and (5) acceptance finding. The syntax of teaching to enhance creative problem solving of pre-service teachers had five steps; Step 1: study information to enhance fact finding, Step 2: problem identification to enhance problem finding, Step 3: generate ideas to enhance idea finding, Step 4: choose the right idea to enhance solution finding and Step 5: implement to enhance acceptance finding.

**Keywords:** Problem Solving Skills, Learning Management, Pre-Service Teachers

### Introduction

In the 21<sup>st</sup> century, innovation is an important aspect of making a difference in human success (Lee and Benza, 2015). People with new ideas create new things to solve problems all the time will be a successful person in life (Maxwell, 2009). The important thinking skills that should be encouraged to happen to humans in this era is creative problem solving because this skills can create new things and make successful (Weiss and Legrand, 2011). Creative problem solving is the process of finding answers or solving problems in order to create a variety of new works include fact finding, problem finding, idea finding, solution finding and acceptances finding (Osborn, 1953). Education management in the 21<sup>st</sup> century is therefore necessary to develop learners to create creative problem solving so that learners will be able to create and develop innovation in their careers and create success for themselves in the future (Bellanca, 2010). How we have professional teachers is a big question then this need to develop creative problem solving at the time of being a teacher of professional students so they can design teaching and learning and develop educational innovation (Clark and French, 2014).

In the world context, Framework for 21<sup>st</sup> Century Learning has defined that important skills for learners are problem solving and other skills (Trilling and Fadel, 2009). However, creative problem solving skills are very important skill that should be promoted to higher education (Davidovitch and Milgram, 2006; Bellanca, 2010 and Williamson, 2011). In the ASEAN context, ASEAN qualifications reference framework and national qualifications frameworks, which see the importance of creative problem solving of learners, have learning outcomes including two domains: 1) knowledge and skills are specialized; 2) application and responsibility are complex and changing (Bateman and Coles, 2015).



For Thailand context, the national qualifications framework (Thailand NQF), which sees the importance of creative problem solving of bachelor degree, has learning outcomes including domains: knowledge, skills, application and responsibility (Ministry of Education, 2017). The standard framework for Thai bachelor degree qualifications define relevant learning standards and promotion of creative problem solving for undergraduates. Standards framework was intellectual skills to assess information media information from various sources, to face and keep pace with changes in the digital world, to perform tasks and diagnose, to solve problems and develop creative work, to learn management methodology, to design activities that help solve problems and to promote the development of learners that meet the needs and potential of learners with differences between individuals. Numerical analysis skills can use information technology to search for information from various learning sources (Ministry of Education, 2019).

From the above, it can be seen that creative problem solving is an important and urgent matter that Thailand needs to develop for Thai youth. The researcher, as responsible for the production of the teacher profession, sees that creative problem solving is an important issue that must be promoted to pre-service teachers when graduating as a teacher. The researcher is interested in studying the management approach, promoting problem solving of pre-service teachers, which will be a guideline for learning, promoting the problem solving of pre-service teachers for education in Thailand.

### Purposes of the Study

To study the learning management guideline to enhance creative problem solving of pre-service teachers

### Research Questions

1. What kind of concepts used for developing a learning management guideline to enhance creative problem solving of pre-service teachers?
2. What is syntax of learning management guidelines to enhance creative problem solving of pre-service teachers?
3. What is core learning management activity guidelines to enhance creative problem solving of pre-service teachers?

### Research Concept Framework

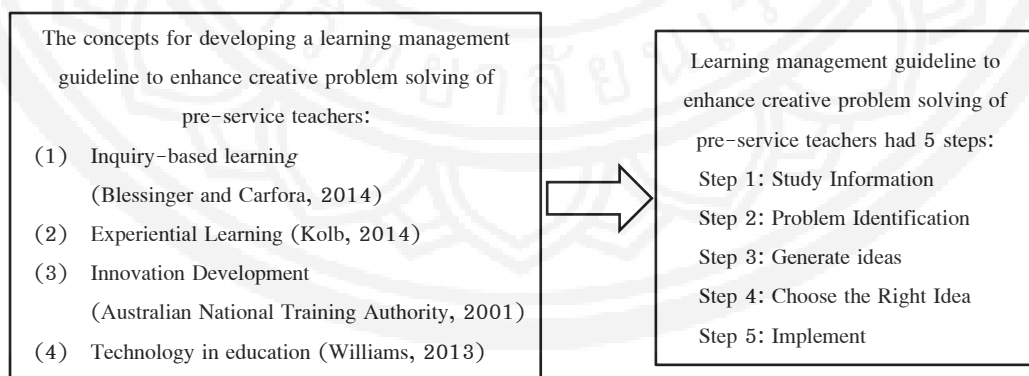


Figure 1 Research Concept Framework



## **Scope and Limitation of the Study**

### **1. Scope of the Population**

1.1 The population are research reports to promoting creative problem solving among higher education students.

1.2 Samples are 61 research papers.

### **2. Scope of the Time**

2.1 The duration of research is in the academic year 2018.

2.2 The deadline for searching for this research is scheduled from 2015–2018.

### **3. Scope of the Contents**

3.1 Research content is form research that promoting creative problem solving with students in higher education.

## **Methodology**

The researcher conducted the research by dividing the research process into 3 phases as follows:

### **1. Phase 1: Document Synthesis**

#### **1.1 Data Sources**

1) Research papers on promoting creative problem solving of pre-service teachers, searched from four databases: Research gate, Springer, ERIC and Emerald. The samples were 61 papers

2) Five experts in curriculum and instruction to consider the relationship consistency

#### **1.2 Research Tools**

1) Synthetic component for creative problem solving of pre-service teachers and the syntax of teaching to enhance creative problem solving of pre-service teachers

2) Assessment form for the synthesis of components

#### **1.3 Research Process**

1) Study research papers on promoting creative problem solving of pre-service teachers which were searched from four databases: Research gate, Springer, ERIC and Emerald, which samples were 61 papers in order to consider concept for develop a learning management guideline to enhance creative problem solving of pre-service teachers.

2) Study appropriate concepts based on creative problem solving of pre-service teachers (Osborn, 1953) and study concepts for synthesis syntax of teaching to enhance creative problem solving of pre-service teachers were four concepts: inquiry-based learning (Blessinger and Carfora, 2014), experiential learning (Kolb, 2014), innovation developing (Australian National Training Authority, 2001) and technology education (Williams, 2013).

3) Synthesis components for creative problem solving and syntax of teaching to enhance creative problem solving of pre-service teachers.

4) Assessment the consistency of synthesis components for creative problem solving and syntax of teaching to enhance creative problem solving of pre-service teachers by four experts in curriculum and instruction in considering the relationship consistency, and giving suggestions

#### **1.4 Research Results**

Research results of phase 1: document synthesis showing, the results as shown in Table 1 and Table 2.



**Table 1** Synthesis Components for Creative Problem Solving and Syntax of Teaching to Enhance Creative Problem Solving of Pre-Service Teachers

Particular	Concepts	Components
Creative problem solving of pre-service teachers	Appropriate concepts for confiscating creative problem solving of pre-service teachers (1) Creative problem solving (Osborn, 1953)	The components for Creative Problem Solving of pre-service teachers had five components; (1) Fact finding (2) Problem finding (3) Idea finding (4) Solution finding (5) Acceptances finding
Syntax of teaching to enhance creative problem solving of pre-service teachers	4 concepts for synthesis syntax of teaching to enhance creative problem solving of pre-service teachers (1) Inquiry-Based Learning (Blessinger and Carfora, 2014) (2) Experiential Learning (Kolb, 2014) (3) Innovation Developing (Australian National Training Authority, 2001) (4) Technology in education (Williams, 2013)	The syntax of teaching to enhance creative problem solving of pre-service teachers had five steps; Step 1: Study Information Step 2: Problem Identification Step 3: Generate ideas Step 4: Choose the right idea Step 5: Implement

Form table 1, it is found that the appropriate concepts for confiscating creative problem solving of pre-service teachers (Osborn, 1953), the components for creative problem solving of pre-service teachers had five components: 1) fact finding, 2) problem finding, 3) idea finding, 4) solution finding, and (5) acceptances finding. Synthesis syntax of teaching to enhance creative problem solving of pre-service teachers by four concepts: inquiry-based learning (Blessinger and Carfora, 2014), experiential learning (Kolb, 2014), innovation developing (Australian National Training Authority, 2001) and technology in education (Williams, 2013). The syntax of teaching to enhance creative problem solving of pre-service teachers had five steps: Step 1: study information, Step 2: problem identification, Step 3: generate ideas, Step 4: choose the right idea and Step 5: implement.

**Table 2** Synthesis Core Teaching Activities to Enhance Creative Problem Solving of Pre-Service Teachers

Concepts	Activities	Core Learning Management Activities
1) Inquiry-Based Learning (Blessinger and Carfora, 2014)	Inquiry – based learning is a learning method that allows learners to create their own knowledge. With a facilitator instructor. There is a way of learning, namely, learners, set questions in learning students focus on and study the evidence. Learners analyze data connect the knowledge gained. And learners communicate and evaluate knowledge with reason.	1) <b>Step 1:</b> Study Information; this step is to organize learning activities for pre-service teachers to study information from various sources about the success, problems, obstacles in the past teaching. 2) <b>Step 2:</b> Problem Identification; this step is to arrange learning activities for pre-service teachers to choose and identify problems for promoting or developing students. Which specific problems may be important skills or abilities.
2) Experiential Learning (Kolb, 2014)	Experiential learning is a practical learning. In order to be experienced There are four important learning elements: Concrete Experience, Abstract Conceptualization, Active Experimentation and Reflective Observation.	3) <b>Step 3:</b> Generate ideas; this step is an activity for pre-service teachers to think of methods or innovations to solve problems by using technology and mobile phones to help in searching for new and diverse methods.
3) Innovation Developing (Australian National Training Authority, 2001)	Innovation Developing is a step in the development of innovation. There are five steps for development Innovation there are interpret, generate, collaborate, reflect, and evaluate.	4) <b>Step 4:</b> Choose the right idea; this step is an activity for pre-service teachers to analyze, critique the concept, then choose or merge the most suitable concepts for innovation to solve problems.
4) Technology in education (Williams, 2013)	Technology education is a learning that uses technology knowledge to be used in teaching and learning in various ways to provide quality teaching such as internet, computer programs Digital devices etc.	5) <b>Step 5:</b> Implement; this is a program for pre-service teachers to use the innovations developed to learn with students. Then study the results.

In Table 2, core learning management activities of five steps is examined. Step 1 organizes learning activities for pre-service teachers to study information from various sources about the success, problems and obstacles in the past teaching. Step 2 arranges learning activities for pre-service teachers to choose and identify problems for promoting or developing students which specific problems may be important skills or abilities. Step 3 is an activity for pre-service teachers to think of methods or innovations to solve problems by using technology and mobile phones to help in searching for new and diverse methods. Step 4 is an activity for pre-service teachers to analyze and critique the concept, then choose or merge the most suitable concepts for innovation to solve problems. Step 5 is a program for pre-service teachers to use the innovations developed to learn with students. Then study the results.

## 2. Phase 2: Academy Study

### 2.1 Data Sources

- 1) Chulalongkorn University: an observation of the teaching for undergraduate students, Faculty of Engineering
- 2) Suan Sunandha Rajabhat University: an observation of the teaching for pre-service lecturers, Faculty of Education
- 3) Lamplaimat Pattana School: an observation of development trainings for new lecturers



## 2.2 Research Tools

- 1) Teaching-activity observation form
- 2) Interview form
- 3) Relations analysis form
- 4) Suitability assessment form

## 2.3 Research Process

- 1) Study the relevant documents for creating teaching activities observation form and interview form.
- 2) Create a teaching observation form and an interview form. Then allow five experts to check the consistency. Update the forms according to the recommendations of the experts until the complete version is done.
- 3) Academy study in Chulalongkorn University by observing the teaching to promote creative problem solving of undergraduate students and interviewing additional instructors.
- 4) Academy study in Suan Sunandha Rajabhat University by observing the teaching for pre-service teachers, Faculty of Education and interviewing additional instructors.
- 5) Academy study in Lamplaimat Pattana School observing the training to promote creative problem solving of new teachers and interviewing the trainer.
- 6) The researcher used data from observations and interviews from both 3 educational institutions to improve learning management guideline to enhance creative problem solving of pre-service teachers.
- 7) The researcher consistency analysis the relationship between the syntax of teaching with creative problem solving of pre-service teachers, by relations analysis form.
- 8) Allow all five experts to check the relations analysis, with suggestions for improvement by suitability assessment form.

## 2.4 Research Results

Research results of phase 2: academic studies, the results as shown in Table 3.

**Table 3** Consistency Analysis of the Relationship between the Syntax of Teaching with Creative Problem Solving of Pre-Service Teachers

The Syntax of Teaching to Enhance Creative Problem Solving of Pre-Service Teachers	Problem Solving of Pre-Service Teachers				
	Fact Finding	Problem Finding	Idea Finding	Solution Finding	Acceptances Finding
Step 1: Study Information	✓				
Step 2: Problem Identification		✓			
Step 3: Generate ideas			✓		
Step 4: Choose the Right Idea				✓	
Step 5: Implement					✓

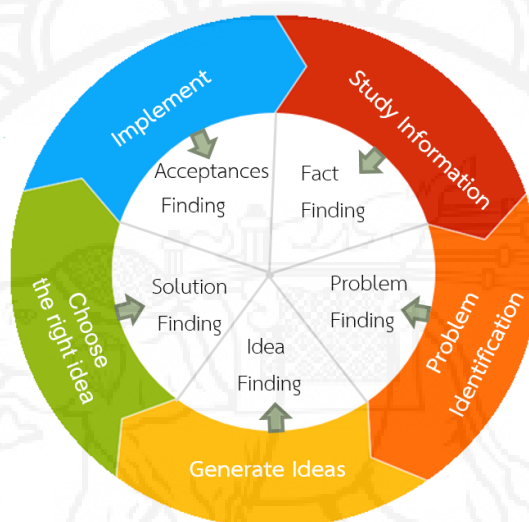
For consistency analysis of the relationship in Table 3, it is found that the syntax of teaching to enhance creative problem solving of pre-service teachers had five steps were steps: step 1) study information to enhance fact finding, step 2) problem Identification to enhance problem finding, step 3) generate ideas to enhance idea finding, step 4) choose the right idea to enhance solution finding, and step 5) implement to enhance findings. These steps can be a learning management guideline to enhance creative problem solving of pre-service teachers.



## Conclusion and Suggestions

### Conclusion

The components for creative problem solving of pre-service teachers had five components: (1) fact finding, (2) problem finding, (3) idea finding, (4) solution finding and (5) acceptances finding. The syntax of teaching to enhance Creative Problem Solving of pre-service teachers had five steps. They consisted of Step 1: study information to enhance fact finding, Step 2: problem identification to enhance problem finding, Step 3: generate ideas to enhance idea finding, Step 4: choose the right idea to enhance solution finding, and Step 5: implement to enhance acceptances finding. Learning management guideline to enhance creative problem solving of pre-service teachers, can be summarized in Figure 2.



**Figure 2** The Syntax of Teaching to Enhance Creative Problem Solving of Pre-Service Teachers

The core learning management activities to enhance creative problem solving of pre-service teachers are generated into five steps. Step 1 is to organize learning activities for pre-service teachers to study information from various sources about the success, problems and obstacles in the past teaching. Step 2 is to arrange learning activities for pre-service teachers to choose and identify problems for promoting or developing students. Specific problems may be important skills or abilities. Step 3 is an activity for pre-service teachers to think of methods or innovations to solve problems by using technology and mobile phones to help search for new and diverse methods. Step 4 is an activity for pre-service teachers to analyze, critique the concept, and choose or merge the most suitable concepts for innovation to solve problems. Step 5 is a program for pre-service teachers to use the innovations developed to learn with students after the results are studied.

### Suggestions

1. The faculty of education can promote creative problem solving of teachers of pre-service teachers by implementing the syntax of teaching in five steps to design teaching and learning in class.
2. Developed learning management guidelines go to trial to be compared with the traditional approach.
3. Developed guidelines for assessment of teachers of pre-service teachers can be studied from the research of Deemee and Lincharoen (2017) on a development approach for assessment learning and innovation skills that apply the assessment of learner method in 21<sup>st</sup> century.



## Discussions

The components for creative problem solving of pre-service teachers had five components; fact finding, problem finding, idea finding, solution finding and acceptances finding (Osborn, 1953). Fact finding was ability of pre-service teachers to study facts from various sources about student learning situations, problematic for lesson and student learning problems. Problem finding was ability of pre-service teachers to choose or identify important problems that need to be solved or improved. Idea finding was ability of pre-service teachers to think of new and diverse solutions. Solution finding was ability of pre-service teachers to choose or merge appropriate solutions. Acceptance finding was ability of pre-service teachers to solve the problem and study the results, all of which correspond to the elements of the creative problem solving framework (Treffinger, Isaksen, and Dorval, 2003).

The syntax of teaching to enhance creative problem solving of pre-service teachers had five steps. It consists of: 1) information to enhance fact finding; 2) problem identification to enhance problem finding; 3) idea generation to enhance idea finding; 4) selection of right ideas to enhance solution finding; and 5) implementation to enhance acceptance finding (Blessinger and Carfora, 2014; Kolb, 2014; Australian National Training Authority, 2001 and Williams, 2013). The learning management guideline was designed as a workload for pre-service teachers to study problems from various data and direct experience, including learning activities for pre-service teachers to find new and different solutions. To choose the most appropriate solution, teachers should bring ideas or methods that can be used to solve real problems. It is necessary to train pre-service teachers to use technology to assist searching, study solutions and manage teaching by using the syntax of teaching to enhance the problem solving of pre-service teachers.

In accordance with standard framework for Thai bachelor degree qualifications that define relevant learning standards, promotion of creative problem solving for undergraduates has three standards: (1) intellectual skills to assess information media information from various sources, knowing how to face and keep pace with changes in the digital world; (2) ability to perform tasks and diagnose, solve problems and develop creative work; and (3) learning management methodology to design activities to help solve problems and promote the development of learners that meet the needs, interests, aptitudes and potential of learners with differences between individuals. Numerical analysis skills communication and use of technology use information technology to search for information or knowledge from various learning sources (Ministry of Education, 2019).

The National Qualifications Framework (Thailand NQF) sees the importance of creative problem solving of bachelor degree with three domains: 1) knowledge defines that students should have extensive theoretical and technical knowledge in a professional system; 2) skills stipulate that students should have analytical skills to criticize and compare problems; and 3) application and responsibility determine whether students should have the ability to solve complex and changing problems, and plan strategies to solve complex and abstract problems in the operation. (Ministry of Education, 2017).

ASEAN qualifications reference framework and national qualifications frameworks have the creative problem solving of learners therefore with two domains: 1) knowledge and skills are specialized; and 2) application and responsibility are complex and changing (Bateman and Coles, 2015).

In accordance with the framework for 21<sup>st</sup> century learning, it can be concluded that learning and innovation skills are critical thinking and problem solving, collaboration and creativity, communication and innovation (Trilling and Fadel, 2009). Here, creative problem solving skills is an important skill that should be promoted to higher education (Davidovitch and Milgram, 2006; Bellanca, 2010 and Williamson, 2011).





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