Full Length Research Paper

An instructional design model with the cultivating research-based learning strategies for fostering teacher students' creative thinking abilities

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Designing the instructional model with the innovative the *Research-Based Learning Strategy Lesson Plans* of the effectiveness of the processing performance and the resulting performance (E1/E2) with the IOC value determining standardized criteria of 80/80 were developed. Students' perceptions were assessed with the 30-item *Research-Based Learning Strategies* (RBLS) in six scales. Students' creative thinking abilities adapted version into the 10-item *Creative Thinking Ability Questionnaire* (CTAQ) was used. Associations between students' perceptions of their cultivating learning strategies and their creative thinking abilities were analyzed. A sample size consisted of 626 senior teacher students from 21 Foundational Education classes in Kamphaeng Phet Rajabhat University in two semesters of the academic year 2015. Statistically significant was found that; the lessening effectiveness (E1/E2) evidenced of 80.73/80.98 over the threshold setting was 80/80. The 5-professional expert educators' responses of the IOC revealed of 0.76. The RBLS and CTAQ were validated and reliable with the internal consistency was analyzed. Students' perceptions of their RBLS and their CTAQ toward Foundational Education Subject were positive relatively. The multiple correlations R was 0.79 and the predictive efficiency value (R^2) indicated that 62% of the variances in students' creative thinking abilities to their classes were attributable for their perceptions of their individualized classroom environments. Suggestions that of these research findings, the designing instructional model for fostering students' creative thinking abilities with the research methodology, research procedure, sample design of research instruments and other components of this research, it would be valuable and had the highest benefit for further research study.

Key words: Designing instructional model, cultivation indoctrination, research-based learning strategy, teacher students,creative thinking ability.

INTRODUCTION

Designing instructional model

Design is more than a process; that process, and resulting product, represents a framework of thinking (Driscoll and Carliner, 2005:9). Instructional design (ID) or instructional systems design (ISD) is the

practice of creating instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing with the designers (Merrill et al., 1996). The process consists broadly of determining the state and needs of the learner, defining the end goal of instruction, and creating some "intervention" to assist in the transition. The outcome of this instruction may be directly observable and scientifically measured or completely hidden and assumed (Forest, 2016). Instructional design, also known as instructional systems design, is the analysis of learning needs and systematic development of instruction. Instructional designers often use Instructional technology as a method for developing instruction. Instructional design models typically specify a method, that if followed will facilitate the transfer of knowledge, skills and attitude to the recipient or acquirer of the instruction (Merrill et al., 1996). Instructional design is the systematic development of instructional specifications using learning and instructional theory to ensure the quality of instruction. It is the entire process of analysis of learning needs and goals and the development of a delivery system to meet those needs. It includes development of instructional materials and activities; and tryout and evaluation of all instruction and learner activities (Barger, 1996).

Instructional model is guidelines or sets of strategies on which the approaches to teaching by instructors are based. Effective instructional models are based on learning theories. Learning theories describe the ways that theorists believe people learn new ideas and concepts. Often, they explain the relationship between information we already know and the new information we are trying to learn (NC State University, 2016). Instructional design is the systematic development of instructional specifications using learning and instructional theory to ensure the quality of instruction. It is the entire process of analysis of learning needs and goals and the development of a delivery system to meet those needs (Instructional Design Central (IDC), 2016).

This research study focused on model for instructional design provided procedural frameworks for the systematic production of instruction. It incorporated fundamental elements of the instructional design process including analysis of the intended audience or determining goals and objectives that followed as the concept of Braxton et al. (1995). An instructional design model gives structure and meaning to an ID problem, enabling the would-be designers to negotiate their design task with a semblance of conscious understanding. Models help to visualize the problem, to break it down into discrete, manageable units. A model should be judged by how it mediates the designer's intention, how well it can share a work load, and how effectively it shifts focus away from itself toward the object of the design activity (Ryder, 2001). Instructional models prescribe how combinations of instructional strategy components should

be integrated to produce a course of instruction (Braxton et al., 1995).

As instructional innovation with the instructional lesson plans advanced and constructivist theory gained popularity, instructional lesson plans were used in the classroom began to evolve from mostly drill and skill exercises to more interactive activities that required more complex thinking on the part of the learner (Markham, 2012). In this process, an instructional design project is prototyped quickly and then vetted through a series of try and revise cycles. This is a big departure from traditional methods of instructional design that took far longer to complete the concept of Reiser (2001). Technology advances permitted sophisticated simulations with authentic and realistic learning experiences (Markham, 2012). Academic degrees focused on integrating technology, the internet, and human-computer interaction with education gained momentum with the introduction of *Learning Design and Technology* (LDT) majors. Universities have established undergraduate and graduate degrees in technology-centered methods of designing and delivering education (Anglin and Towers, 1992). This section was the historical background of the instructional design model. Moreover, emphasized that this research within an University, then, may be summarized as the knowledge about research topics and processes which are sanctioned as appropriate and relevant; the values, beliefs, creative thinking skills and norms which surround the research process within the University; and the various material ways in which the University supports or denies support to its researching individuals and groups. New values, beliefs and norms about research develop as individuals and groups attempt to carry out research projects of what the University has previously approved through the cultivating research-based learning strategies.

Instructional design model in the 21st century

In the 21st century, the instructional design model helps instructional designers to make sense of abstract learning theory and enables real world application. An instructional design model provides structure and meaning to an instructional design problem. Many of them have common instructional design principles and patterns that are used to design learning experiences, courses, and instructional content (Instructional Design Central, 2016). An instructional design model is used to define the activities that will guide the development of teacher projects. It allows teachers to communicate the purpose and reason behind a strategy. A framework gives teachers the birds-eye view of all the major components that have to be included in the course. If a teacher is a new instructional design model, then understanding and following instructional design best

practices from the beginning is crucial to your success. It is vast, and you will find numerous theories, models, and resources that have worked for different experts (Gutierrez, 2015).There are many instructional design models, for example, the ADDIE model with the five phases: Analysis, design, development, implementation, and evaluation. As a field, instructional design is historically and traditionally rooted in cognitive and behavioral psychology, though recently constructivism influenced thinking in the field of education (Mayer, 1992).

Research based learning strategies

Learning strategies help students organize their thinking and be successful learners, but there's a little more to it than following a recipe for instruction (Linde, 2014). Read on to learn about important research and how this directs instructional practices.

Research-based principles of learning and teaching strategies

In education, research team defined learning strategies as techniques used by students to become familiar with information. In other words, it is how we take in information and apply it to other areas of our lives. Without good strategies, students can struggle with acquiring and using the information they are taught in the classroom. Luckily, educators can directly instruct students on how to become active learners by teaching learning strategies, those strategies that show students how to take in new information and use it in valuable ways. Teachers bring a lot of instinct to their classrooms, but they are not born knowing what is best for all students. Educational research helps illuminate what has been shown to be effective so teachers can use the best methods of instruction in their own classes. Research can be broken down into two categories: Brain science and teachers. Teachers can encourage students to incorporate active learning principles into their own studies by assigning some of these tools in class. For instance, as students begin to learn about in this research study, they might start the unit by not only memorizing facts and dates pertinent to the war, but also rephrasing the information into their own words and visualizing it.

These principles are distilled from research from a variety in disciplines. Students' prior knowledge can help or hinder learning. Students come into our courses with knowledge, beliefs, and attitudes gained in other courses and through daily life. A widely used adjective in education, evidence- based refers to any concept or strategy that is derived from or informed by objective evidence, most commonly, educational research or

metrics of school, teacher, and student performance. The *Research-Based Learning Strategies* for successfully linking teaching and research, Research-based learning is a multi-faceted concept referring to a variety of learning and teaching strategies that link research and teaching. Good practice in research-based learning may include: Research outcomes informing the innovative teaching plans, research process based methods of teaching and learning, learning to use the tools of research, and developing an inclusive research context (Blackmore and Fraser, 2007). Although at first glance, creative thinking techniques may sometimes look like a bit ridiculous, there are good principles behind most of them. However, the research team might be about the potential, it is a good idea to approach them with an open mind of our students.

Creative thinking abilities

In the three last decades, researchers have conclusively demonstrated that creativity can be nurtured and enhanced through the use of deliberate tools, techniques, and strategies. *HOW can you help your students become more creative?* Exactly*,* to improve creative thinking, a teacher can *encourage creativity by students* during activities that *provide opportunities for them to be creative;* while they are learning useful principles and strategies (Facione, 2001). Creative or innovative thinking is the kind of thinking that leads to new insights, novel approaches, fresh perspectives, and whole new ways of understanding and conceiving of things. The products of creative thought include some obvious things like music, poetry, dance, dramatic literature, inventions, and technical innovations. But there are some not so obvious examples as well, such as ways of putting a question that expand the horizons of possible solutions, or ways of conceiving of relationships that challenge presuppositions and lead one to see the world in imaginative and different ways (Facione, 2001). A way of looking at problems or situations from a fresh perspective that suggests unorthodox solutions, which may look unsettling at first; creativity is the act of turning new and imaginative ideas into reality. Creativity is characterized by the ability to perceive the world in new ways, to find hidden patterns, to make connections between seemingly unrelated phenomena, and to generate solutions. Creativity involves two processes: Thinking, then producing (May, 2014). Creative thinking can be stimulated both by an unstructured process such as brainstorming, and by a structured process such as lateral thinking.

In this research study, designing the practice of creating instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing were assessed. The process consists broadly of determining the state and needs of the learner, defining the end goal of instruction, and

creating some "intervention" to assist in the transition. The outcome of this instruction may be directly observable and scientifically measured or completely hidden and assumed (Merrill et al., 1996). The instructional learning model with the cultivating research-based learning strategies was adapted as well as the researcher's framework for fostering teacher students' creative thinking abilities at the Faculty of Education in Kamphaeng Phet Rajabhat University in Thailand is provided.

METHODOLOGY

The designing instructional model with the cultivating research-based learning strategies to their creative thinking skills at the Faculty of Education in Kamphaeng Phet Rajabhat University in Thailand was to describe into five theoretical framework that following as:

1. Designed and administered from the research-informed teaching innovative teaching plans design that following guidelines were adapted from Blackmore and Fraser (2007).
2. To assess the efficiency of the processing performances and the performance results (E_1/E_2) at the determining criteria as 75/75 to promote students' learning achievements of their instructional innovative lesson plans of the cultivating research-based learning strategies.
3. A blending of creativity and critical thinking is necessary for productive thinking that produces a high-quality solution for a problem.
4. A preliminary quantitative research method study with the questionnaire technique was used. The conclusions consider further research designs and the expertise necessary for multiple methods research.
5. This educational research shines the light on how children learn. There are three viewpoints that can help determine whether a student is using learning strategies or not. The first learning strategy asks the question, 'How do you remember new information?' There are a range of tools used by active learners that help them retain information that is new to them. Successful students use all of these learning strategies to make sense of new information.

Research procedures

The Educational Research Technique was the foundational research to be designed on the instructional strategies for presenting content describe the ways of presenting information during teaching and learning on a group of educational foundation classroom environment, to the instructional model through impressive educational students of their *Cultivating Research-Based Learning Strategies* (RBLS).The RBLS instructional strategies have been demonstrated to, in at least one study, be "effective." As implied, it is not that simple and it does not mean it will work well in our next lesson.

Phase I: Developing the research-based learning strategies (RBLS) innovative teaching plans

Based on the framework of Blackmore and Fraser (2007), the *Research-Based Learning Strategies* in four elements are identified as being important in the design of the RBLS.

Step I (The Four Elements of the Framework of Blackmore and

Fraser): The framework's Blackmore and Fraser for developing the research-based innovative teaching plans in four elements are identified as:

1. Outcomes: Including research outcomes in the innovative teaching plans (for example modules designed around the research interests of staff).
2. Process: Using research-process-based methods of teaching and learning (for example problem-based learning).
3. Tools: Learning to use the tools of research (for example bibliographic searching, field skills, quantitative analysis etc.)
4. Context: Developing an inclusive research context and culture (for example students assisting with staff research, student and staff research seminars etc.).

Step II (The Seven Principles for Good Practice in Undergraduate Education): The following innovative teaching plans design, toolkit, was based on these four elements and the Seven Principles for Good Practice in Undergraduate Education by Chickering and Gamson (1987). This research design and the subsequent creation, validation and dissemination of knowledge, are fundamental to the operation of a research-intensive of the University. The intention of research-based learning was that university academics should make positive moves to help students build strong intellectual and practical connections between research frontiers and the students' own learning. Student benefits include:

Inducting students into the disciplines' values, practices and ethics; *Ensuring* course content that includes cutting edge research findings; *Increasing* students' understanding of how their chosen discipline contributes positively to the society; *Developing and enhancing* students skills and capabilities including *Generic skills* such as critical and analytical thinking, information retrieval, and evaluation and problem-solving; *Skills in conducting and evaluating* research that is helpful to students' ongoing personal and professional lives; *Providing enhanced opportunities* for teaching and learning approaches such as inquiry-based and experiential methods that have been linked to positive learning outcomes for students.

This step was built with the goals of the innovative instructional lesson plans of the Foundational Education content for teacher students.

Phase II: Teacher students' perceptions of their cultivating the research-based learning strategies

In education, researcher team defines learning strategies as techniques used by teacher students to become familiar with the information. In other words, it is how we take in information and apply it to other areas of our instruction. Without good strategies, students with struggle with acquiring and using the information they are taught in the classroom. We can directly instruct students on how to become active learners by teaching learning strategies, those strategies that show teaches students how to take in new information and use it invaluable ways.

Interestingly, although research and evaluation in education have relied heavily on the assessment of academic achievement and other valued learning outcomes, these measures cannot give a complete picture of the educational process. Students have a large stake in what happens to them at university and their reactions to and perceptions of their university experiences are significant. Using students' perceptions to study educational environments can be contrasted with the external observer's direct observation and systematic coding of classroom communication. This section describes the following important and adapting contemporary research instruments were built.

Step I (Good practice in research-informed teaching: Include

Table 1. The 5-Item of the integrating research scale for the RBLS.

Item	Research-informed teaching	Scoring perceptions				
		1	2	3	4	5
1	Instructors direct their students towards relevant research papers to read on a regular basis					
2	Instructors update their teaching materials with recent research on a regular basis					
3	Instructors stress the importance of reading beyond the core text books					
4	Instructors integrate their own research into their teaching					
5	Instructors direct their students to newly published research					

Table 2. The 5-item of the understanding role research scale for the RBLS.

Item	Research-informed teaching	Scoring perceptions				
		1	2	3	4	5
1	Instructors explain the development of ideas in their discipline					
2	Instructors explain how research methodology, methods and ethical considerations have developed in their discipline					
3	Instructors discuss how research methodology, methods and ethical considerations in their discipline may develop in the future					
4	Instructors explain why research in their discipline is important					
5	Instructors discuss with students the real-world application of research in their evaluation					

outcomes of recent: Research in the foundational education innovative teaching plans): Teacher students have a right to expect that their innovative teaching plans are fully informed by recent research in their chosen area of study and, to a certain extent, research and integration of research into the innovative teaching plans are what defines us as this University; irrespective of whether teaching staff are 'research active' and researcher team was built the research instrument for students' responses of their instructors of these questions. This is called *Integrating Research* scale of the RBLS that it is the first scale to obtain the five items and the five response alternatives are almost never, seldom, sometimes, often and very often. Table 1 reports of the *Integrating Research* scale.

Step II (Good practice in research-informed teaching: Develop an understanding of the history and role of research in the discipline): It is important that students have some awareness of how research has developed in their chosen subject area. Not only does this provide an important context in terms of showing the relevance of material being taught, but it provides students with a level of methodological knowledge and demonstrates that knowledge was constantly evolving and developing and that they had a part to play in that evolution and development.

Students' perceptions of this section, it's called *Understanding Role Research* scale of the RBLS, that is the second scale to obtain five items and the five response alternatives are almost never, seldom, sometimes, often and very often. Table 2 shows the *Understanding Role Research* scale.

Step III (Good practice in research-informed teaching: Engage students in generic research processes and skills): By attaining a suite of generic research skills students learning to become enquiring and analytical skills that are becoming increasingly demanding of students upon graduation are designed (Jenkins et al., 2011). Generic research training also provides a suite of valuable transferable skills. Students' perceptions of this section; it is called *Generic Research Processes and Skills* scale of the RBLS that it is the third scale to obtain of five items and the five response alternatives are almost never, seldom, sometimes, often and very often. The Generic Research Processes and Skills scale reports in Table 3.

Step IV (Good practice in research-informed teaching: Fosters an environment where research was encouraged, promoted and valued): Fostering a 'research-rich' environment enthuses and motivates students and was invaluable in helping to break down the 'them and us' barriers that may exist between teaching staff and students. Students' perceptions of this section, it's called fostering environmental research scale of the RBLS that is the fourth scale to obtain five items and the five response alternatives are almost never, seldom, sometimes, often and very often. Table 4 shows the items of *Fostering Environmental Research* scale.

Step V (Good practice in research-informed teaching: Engage students in enquiry-based activities): Here, students learn the importance of identifying where knowledge may be limited and thereby find ways to enhance knowledge (Blackmore and Fraser, 2007). Enquiry-based activities also allow teamwork skills to be developed and students move from being the audience to become participants in their learning. Students' perceptions of this section, it is called *Enquiry-Based Activity Research* scale of the RBLS that it is the fifth scale to obtain of five items and the five response alternatives are almost never, seldom, sometimes, often and very often. Table 5 shows the items of *Enquiry-Based Activity Research* scale.

Step VI (Good practice in research-informed teaching: Draw on pedagogic research to enhance teaching and research links): The seven principles of good practice in undergraduate education, as defined by Chickering and Gamson (1987) can and should

Table 3. The 5-Item of the generic research processes and skills scale for the RBLS.

Item	Research-informed teaching	Scoring perceptions				
		1	2	3	4	5
1	Instructors teach generic research skills within the innovative teaching plans					
2	Instructors emphasize cross-innovative teaching plans application of generic research skills and techniques					
3	Instructors highlight the real-world application of generic research skills and techniques					
4	Instructors provide exercises where students apply research skills to data/information that they have collected					
5	Instructors ensure students undertake tasks that allow research skills to be practiced					

Table 4. The five items of the fostering environmental research scale for the RBLS.

Item	Research-informed teaching	Scoring perceptions				
		1	2	3	4	5
1	Instructors invite external speakers to come and speak about their research					
2	Instructors encourage students to discuss their research together and work on joint research projects					
3	Instructors arrange visits to scholarly University (for example Royal Society, other Universities, British Library, Art Galleries etc.)					
4	Instructors encourage students to attend staff research presentations within my University					
5	Instructors encourage and support students to apply for research funding or other research-related awards					

Table 5. The Five items of the enquiry-based activity research scale for the RBLS.

Item	Research-informed teaching	Scoring perceptions				
		1	2	3	4	5
1	Instructors provide opportunities for students to work together in groups to solve research/real-world problems					
2	Instructors present students with specific problems to which they have to apply research skills					
3	Instructors expect students to collect data/information to address specific research questions/real-world problems					
4	Instructors present students with realistic scenarios to which the whole cycle of research has to be applied					
5	Instructors encourage students to work with staff on specific research questions/projects					

be applied to the design of a research-based innovative teaching plans, just as they should in other areas of teaching. Continual innovative teaching plans development in the light of the results of sound pedagogic research is arguably pivotal to all that researcher team did. Students' perceptions of this section, it is called *Pedagogic and Linking Research* scale of the RBLS that it is the sixth scale to obtain of five items and the five response alternatives are almost never, seldom, sometimes, often and very often. The items of the *Pedagogic And Linking Research* scale are reported in Table 6.

Phase III (Design creative thinking in foundational education)

This is the simplest phase of taking action research plan and

implement of ideas built to search the situation veers away from the research team plans to next steps.

Step 1: Principles and strategies for increasing creative thinking skills: There is some activity in mainstream K-12 schools and higher education. Underground educational students programs seem to focus on critical thinking more than creative thinking, but some "thinking skills" programs combine critical thinking with creative thinking and in some, the focus is on creativity. Researcher team summaries of scientific principles and practical strategies from Jeffrey Baumgartner (2016) and adapted his ideas to build up the questionnaire to assess students' perceptions of their creative thinking abilities in the Foundational Education classes to increase their creativity by shifting how researchers approach problems, including just being more observant and asking better questions

Table 6. The Five Items of the pedagogic and linking research scale for the RBLS.

Item	Research-informed teaching	Scoring perceptions				
		1	2	3	4	5
1	Instructors apply 'principles of good practice' across all their academic activities					
2	Instructors apply appropriate teaching and learning research when designing their teaching sessions					
3	Instructors encourage students to become participants rather than observers					
4	Instructors refer to case studies of 'good practice' when developing the innovative teaching plans					
5	Instructors regularly update their teaching practice by attending relevant workshops and/or reading pedagogic literature					

Table 7. The 10-item creative thinking ability questionnaire (CTAQ)

Item	Creative thinking skills	Scoring perceptions				
		1	2	3	4	5
1	I have the best way to clarify and identify the problem and understand the underlying issue					
2	I have more questions that I can ask to help clearly define the problem and by the time I have answered all these questions					
3	Depending on the nature of the problem, I need to do a great deal of research					
4	I have the data sources of information and opinion that libraries are fantastic for in-depth information					
5	I am clear on the real issue behind my problems or goals to turn these issues into creative challenges					
6	I have ideas for finding a logical approach to solving both problems in a coordinated way					
7	My ideas are respective generation approach that I can simply them on my map and enter them onto a computer document					
8	If I have browsed the web for my idea generation, I will find lots of creative ideas on how to generate creative ideas					
9	I focus only on the "best" ideas to choose the less creative ones and include my favorite in the initial of ideas					
10	I often can implement several ideas to solve my challenge to keep in mind that I do not need to limit myself to one winning idea					

(Table 7).

Step II (Design creative thinking in education questionnaire)*:*
However, there are numerous different approaches to the creative thinking ability. It is more focused on innovation that is the implementation of the most promising ideas. It involves straightforward on seven steps. The researchers were integrated of A 7-step CPS framework of Jeffrey Baumgartner to the version of our research instrument of the *Creative Thinking Ability Questionnaire* (CTAQ) was used in this research study.

Research aims

This research study focused on students of 626 junior teacher students in 10 Educational Programs, Faculty of Education, Kamphaeng Phet Rajabhat University in Thailand. The research questions are as follow:

Research Question 1: How much level of the cultivating research-based learning strategies innovative lesson plans are assessed with the hypothesis of the processing and performance resulting effectiveness's standardized criteria and the IOC quality's responses?
Research Question 2: The Research-Based Learning Strategies (RBLS) in this research study are there valid and reliable?
Research Question 3: The Creative Thinking Ability Questionnaire (CTAQ) used in this research study, are they valid and reliable?
Research Question 4: What are the associations between students' perceptions of their research- based learning strategies and their creative thinking abilities?

Research instruments

The following strategies provide a guide for incorporating research-based learning into courses and programs. There is overlap between categories and some suggestions are more appropriate in some disciplines at some year levels and in some teaching and

learning contexts than others. They give a range of options that will be most effective if tailored to a particular context and student cohort, with the research instruments.

The research-based learning strategies innovative teaching plans

The *Research-Based Learning Strategies Innovative Teaching Plans were designed* from the context of the Foundational Education Course Content and it composed of eight lesson plans administered in 45 h. This innovation focused on students' learning outcomes, the research-process-based method, instructional tools, and foundational education context. Student benefits include inducting students' disciplines, ensuring course content, increasing students' understanding, developing and enhancing students' skills, generic critical and analytical thinking skills, skills in conducting and evaluating research, and providing enhanced opportunities for teaching and learning approaches.

The Research-Based Learning Strategies (RBLS)

Using the 30-item *Research-Based Learning Strategies* (RBLS), the 7-step CPS framework of the research-informed teaching innovative teaching plans design was adopted and the following guidelines were gotten from Blackmore and Fraser (2007). The RBLS has six scales, namely; Integrating Research, Understanding Role Research, Generic Research Processes and Skills, Fostering Environmental Research, Enquiry-Based Activity Research, and Pedagogic and Linking Research scales. Each scale obtained with five items and the five response alternatives are almost never, seldom, sometimes, often, and very often.

The Creative Thinking Ability Questionnaire (CTAQ)

Students' perceptions of their creative thinking abilities were assessed with the *Creative Thinking Ability Questionnaire* (CTAQ) with 10 items and the five response alternatives are almost never, seldom, sometimes, often and very often.

Sample

To administer, the sample size which consists of 626 junior teacher students, who were the third year students and studied in level of Bachelor Degree in Education, in 10 Educational Programs from 21 foundational education classes in two semesters in the 2015academic year, at the Faculty of Education in Kamphaeng Phet Rajabhat University with the purposive random sampling was selected.

Data analysis

The quality instrument of the *Research-Based Learning Strategies Innovative Teaching Plans* was analyzed by the IOC and the Processing Performance Effectiveness (E1) and the Resulting Performance Effectiveness (E2) by the 5-professional expert educators

The validity and reliability of research instruments were assessed with internal consistency, Cronbach alpha reliability, and discriminant validity. Data differentiated was statistically significant to compare with the independent variable t-test and ANOVA results (eta^2), because of using the one statistic that minimizes the effects of this issue is called partial eta^2. Partial eta^2 can be defined as the

ratio of variance accounted for by an effect and that effect plus its associated error variance within an ANOVA study. Associations between students' perceptions of their *Research-Based Learning Strategies* and their *Creative Thinking Abilities* toward Foundational Education Content with simple and multiple correlations, standardized regression weight abilities and the coefficient predictive value (R^2) were analyzed.

RESULTS

Educational research shines the light on how students learn. There are three viewpoints that can help determine whether a student is using learning strategies or not. The first learning strategy asks the question, *'How do you remember new information?'* There is a range of tools used by active learners that help them retain information that is new to them. *How do you study information?* Once information has been initially stored in the brain, active learners utilize a separate set of techniques that help push the surface knowledge to long-term memory. And finally, the third strategy to active learning asks, *'What do you do with your new learning?'* Successful students do not just take in new learning. This research study emphasizes the research designs and administrations of the target goals into the groups of teacher students in the Faculty of education in the institutes at the Office of Higher Education Commission in Thailand. They investigated their learning outcomes and their performances.

The effectiveness of the innovative instructional lesson plans

To analyze the effectiveness of the *Research-Based Learning Strategies Innovative Teaching Plans, are* based on the model of learning management in the *Research-Based Learning Strategies Method* in Foundational Education classes with the processing and performance resulting effectiveness at 80/80 criteria. Table 8 reports of the effectiveness of the innovative instructional lesson plans

Table 8 shows the results for the effectiveness of the innovative instructional lesson plans based on the model of learning management in the *Research-Based Learning Strategies Innovative Teaching Plans*. The effectiveness of lessons during the learning process (E1) reveals 80.73 and the performance effectiveness (E2) indicate that 80.98, so the lessening effectiveness (E1/E2) evidences of 80.73/80.98 over the threshold setting is 80/80.

In terms of the Index of item-objective congruence (IOC), the validity of the quality of the *Research-Based Learning Strategies Innovative Teaching Plans* was checked that the value of correspondence between the question and the objective or content by the 5-professional expert educators responses of the IOC evidence of 0.76.

Table 8. Score total, mean, standard deviation, and percentage for the effectiveness research-based learning strategies innovative teaching plans.

Teaching plan	Total			
Efficiency performance processes (E_1)	3,420	72.66	41.26	80.73
Efficiency performance results (E_2)	1,140	26.21	81.12	80.98
The lessoning effectiveness (E1/E2)	80.73/80.98			

N = 626.

Table 9. Scale means' score, means, standard deviations, scale internal consistency (Cronbach Alpha Reliability), discriminant validity and F-test for the RBLS.

Scale	Mean (30)	Average mean (5)	Standard deviation	Cronbach alpha reliability	Discriminant validity	*F*-test
Integrating research	23.19	3.86	7.49	0.70	0.73	12.69**
Understanding role research	24.04	4.02	7.55	0.72	0.73	16.82**
Generic research processes and skills	22.16	3.69	7.13	0.73	0.73	11.47**
Fostering environmental research	25.07	4.18	6.89	0.76	0.72	19.53***
Enquiry-based activity research	22.39	3.73	7.56	0.74	0.72	12.98**
Pedagogic and linking research	23.45	3.91	7.45	0.71	0.73	13.67**
Average total	23.38	3.90	7.51	0.82		21.86**

*N = 626, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.*

Validity of the Research-Based Learning Strategies (RBLS)

Table 9 shows the description of quantitative data of analyzing responses for senior teacher students' assessments reported for the *Research-Based Learning Strategies* (RBLS).The internal consistency (Cronbach alpha coefficient) and the mean correlation of each scale with the other scales were obtained for the sample in this present study as indices of scale reliability and discriminant validity for the RBLS. The RBLS consists of five scales, namely: *Integrating Research, Understanding Role Research, Generic Research Processes and Skills, Fostering Environmental Research, Enquiry-Based Activity Research, and Pedagogic and Linking Research* scales.

The results given in Table 9 shows the mean scores for each of the six RBLS scales. As each scale has five items ranging from 22.16 to 25.07 and average total score as 23.38. The average mean scores ranged from 3.69 to 4.18 and average total score as 3.90, respectively. Table 9 reports the internal consistency which ranged from 0.70 to 0.76 when using the actual scores. A successful evaluation of discriminant validity on each scale shows that a scale of the RBLS is correlated with other scales designed to measure the different three sales theoretically. The *F*-test is the test statistic that has an F-distribution. Table 9 reports that the statistically significant is an *F*-test is a ratio reflecting different sources of variability at level 0.01.

Validity of the Creative Thinking Ability Questionnaire (CTAQ)

Using the description of quantitative data of analyzing responses for senior teacher students' assessments was reported for the 10-item *Creative Thinking Ability Questionnaire* (CTAQ). Internal consistency (Cronbach alpha coefficient) and the mean correlation were obtained for the sample in this present study as indices of scale reliability of the CTAQ as 0.83.

Associations between students' perceptions of their research-based learning strategies and their creative thinking abilities

Given the potential for students' perceptions to enhance creative thinking abilities in Foundational Education Classrooms were qualities explored to determine their relationship with students' perceptions of their Research-Based Learning Strategies environment. Correlation's studies identified significant differences in students' perceptions according to achievements made. In this study, it was also considered important to investigate associations between students' perceptions of their *Research-Based Learning Strategies* and their *Creative Thinking Abilities.*

The Cronbach Alpha Reliability of the selected CTAQ was 0.83 when using the individual student as the unit of analysis. This suggests that the scale is reliable for

Table 10. Associations between RBLS scales and CTAQ to fundamental education in term of simple correlation (r), multiple correlations (r) and standardized regression coefficient (β).

Scale	Simple correlation (r)	Standardized regression validity (β)
Integrating research	0.32**	0.31**
Understanding role research	0.28**	0.27**
Generic research processes and skills	0.32**	0.30**
Fostering environmental research	0.34**	0.33**
Enquiry-based activity research	0.28**	0.27**
Pedagogic and linking research	0.26**	0.24**
Multiple correlation (R)	0.7898**	
Coefficient predictive value (R^2)	0.6239**	

N = 626, $^*\rho < 0.05$, $^{**}\rho < 0.01$, $^{***}\rho < 0.001$.

measuring students' creative thinking abilities in Foundational Education classes with the RBLS. These involved simple correlation and multiple regression analyses of relationships between the RBLS scales as a whole and the CTAQ reported in Tables 10.

Table 10 reported simple correlation and multiple regressions analyses were conducted to examine whether associations exists between students' perceptions of their research-based learning strategies and their creative thinking abilities' affective outcomes. Table 10 shows the actually correlations between students' creative thinking abilities' towards Foundational Education and designing the instructional model of the research-based learning strategies among six scales, when using a simple correlation analysis (r) and the standardized regression validity (β) are significant, and positive relatively. The multiple correlations R was 0.79 and the predictive efficiency value (R^2) indicated that 62% of the variances in students' creative thinking abilities to their Foundational Education classes were attributable for their perceptions of their individualized classroom environments.

DISCUSSION

This research study was to design the instructional model with the cultivating research-based learning strategies for fostering teacher students' creative thinking abilities at the Faculty of Education in Kamphaeng Phet Rajabhat University in Thailand. Strategies for successfully linking teaching and research to draw on personal research in designing and teaching courses to incorporate current research directly into the innovative teaching plans as the focus of an entire course, was referred to students' own experience of tackling 'real world' problems in this research study; as illustrative examples to help students understand ideas, concepts and theories. The Illustration of the values, practices and ethics of students' discipline by having faculty members, including postgraduate students, discuss their current research projects. The

place, where the latest research in the field within its historical context in classroom teaching to contextualize discussion of current research findings by referring to some of the discredited theories of the past and the passionate debates of the present (Green, 2013). This research study demonstrated the provisional nature of knowledge and its dynamic and evolving nature with a historical perspective showing how current policies and practices have evolved from earlier practices.

Designing learning activities around contemporary research issues for asking students to explore cutting-edge research problems or to suggest solutions to current real world problems based on their knowledge of the fundamentals of the discipline. This activity includes asking students to investigate the reporting of the status of a current research question in the discipline by comparing media reporting of a study with the official report. Analyzing the methodology and argument presented in setting out recent research findings has conducted a small-scale literature review, leading to a conclusion about the current state of knowledge and further questions to be addressed (Baldwin, 2005). Building the research methods, techniques and skills explicitly within programs to develop students' understanding of research methodologies during their classes and designing research methodology courses that provide opportunities to apply research skills to authentic research problems is assessed.

Building the research instruments with small-scale research activities into undergraduate assignments students at all levels can benefit from small-scale research activities and can often be carried out in groups. This mirrors the research culture of working in research teams rather than conducting individual research to ask students' perceptions toward analyzing research data from existing 'real world' projects. Especially, to provide students with a research question which requires them to conduct a small-scale literature review, decide on methodology, gather data, write up results and reach conclusions for offering capstone courses that focus on a major project utilizing the research skills and disciplinary

knowledge acquired in previous semesters (Healey and Jenkins, 2011). Involving students in departmental research projects to give students a self-contained project within a larger project for organizing students to act as research assistants to higher degree research students or faculty members are organized site visits to university research centers (Fierke, 2015).

Instructors might be encouraged students to feel part of the research culture of other departments that inform undergraduate students about the research interests and strengths of staff in the departments in which they are studying to refer to colleagues' areas of interest and achievements and, where possible, invite them to speak to students about their work (Green, 2013). Talking about the process that researchers go through before their work is published and the number of revisions typically involved for providing structured learning experiences that require students to develop these values, such as, providing research articles presenting opposing arguments on the same topic and asking students to analyze their validity and draw a conclusion (Baldwin, 2005).

This research study reports typical validation data for selecting the Research-Based Learning Strategies and their Creative Thinking Abilities were validated and reliable of the RBLS and CTAQ instruments were checked. The internal consistency/reliability (Cronbach alpha reliability coefficient) and discriminant validity (using the mean correlation of a scale with the other scales in the same instrument as a convenient index) and the ability of a scale were also found. A summary of these values obtained separately for the actual RBLS and CTAQ are expected reliability estimates were higher when the class means was used as the unit of analysis. On the whole, the statistics obtained were acceptable, though somewhat higher. This research investigating the associations between associations exists between students' perceptions of their research-based learning strategies and their creative thinking abilities toward foundational education. Having a standardized set of items for the assessment of achievement was shown to give more comparable sample results. Designing instructional model with the Cultivating Research-Based Learning Strategies and their Creative Thinking Abilities had a positive effect on both the six scales of RBLS students in highly motivated classes had a more favorable perception of their instructors indicate 62% for the sample size with 626 junior teacher students.

Conclusions

In this research study, designing instructional model through teacher students with the cultivating research-based learning strategies for enhancing their creative thinking skills at the Faculty of Education in Kamphaeng Phet Rajabhat University, Thailand, was investigated in 21 Foundational Education Classes to teach 626

students in two semesters in the academic year 2015. The main purposes were to develop the instructional model as the Cultivating *Research-Based Learning Strategies.* Innovative lesson plans were assessed with the hypothesis of the processing and performance resulting effectiveness's standardized criteria and the IOC quality's research innovations were assessed and the quality of the innovation teaching plans.

Adapted versions of the framework of the 7-Strategies for successfully linking teaching and research of good practice guides (Blackmore and Fraser, 2007) to the research instrument, namely: the *Research-Based Learning Strategies (RBLS)* questionnaire that has never been used to assess students' perceptions of their learning outcomes in Thailand was designed. The RBLS obtained with 6 scales, namely: *Integrating Research, Understanding Role Research, Generic Research Processes and Skills, Fostering Environmental Research, Enquiry-Based Activity Research, Pedagogic and Linking Research* Scales. Each scale composed of five items, total of 30 items and the five response alternatives are almost never, seldom, sometimes, often and very often.

The 10-item *Creative Thinking Ability Questionnaire* (CTAQ) was built from the framework of Craig Rusbult (2014), who examined the *5-Way to Creative Generate Ideas* for including *Guided Generation* when Critical Thinking stimulates-and-guides Creative Thinking and *Free Generation*, and describes some of the ways a freely creative generation of Ideas can be hindered. The CTAQ was built to assess students' perceptions of their Creative-and-Critical Community to adjust the interactions between creative thinking abilities and their learning with the RBLS is associated.

As these research instruments, the RBLS and CTAT have never been used to study in Thailand, the validity and reliability were analyzed. Using the Internal consistency (Cronbach alpha coefficient) and the mean correlation, obtained for the sample in this present study, was used.

These research findings, the effectiveness of the innovative instructional lesson plans based on the model of learning management in the *Research-Based Learning Strategies Innovative Teaching Plans*. The effectiveness of lessons during the learning process (E1) reveals 80.73 and the performance effectiveness (E2) indicate 80.98, so the lessening effectiveness (E1/E2) evidence of 80.73/80.98 over the threshold setting is 80/80. Focused on the *Index item-objective congruence* (IOC), it was validated that the innovative quality of the *Research-Based Learning Strategies Innovative Teaching Plans* was checked. The value of correspondence between the question and the objective or content by the 5-professional expert educators' responses to the IOC evidence was 0.76. This result answered the research question 1.

The description of quantitative data of analyzing

responses for senior teacher students' assessments reported for the *Research-Based Learning Strategies* (RBLS). Internal consistency (Cronbach alpha coefficient) and the mean correlation of each scale with the other scales were obtained for the sample in this present study as indices of scale reliability and discriminant validity for the RBLS. The RBLS consists of five scales, namely: *Integrating Research, Understanding Role Research, Generic Research Processes and Skills, Fostering Environmental Research, Enquiry-Based Activity Research, and Pedagogic and Linking Research* scales. The mean scores for each of the six RBLS scales, as each scale has five items ranging from 22.16 to 25.07 and average total score as 23.38. The average mean scores ranged from 3.69 to 4.18 and average total score as 3.90, respectively. The internal consistency which ranged from 0.70 to 0.76 when using the actual scores, the successful evaluation of discriminant validity on each scale shows that a scale of the RBLS was correlated with other scales designed to measure theoretically the different three scales were revealed. Using an *F*-test is the test statistic has an F-distribution. The statistically significant *F*-test is the ratio reflecting different sources of variability at the level of 0.01.This result is answered the research question 2.

Using the 10-item *Creative Thinking Ability Questionnaire* (CTAQ) to assess students' perceptions to the description quantitative data of analyzing responses for the sample target students' assessments reported of the internal consistency (Cronbach alpha coefficient) and the mean correlation were obtained in this present study as indicated by the scale reliability of the CTAQ as 0.83. This result answered the research question 3.

In terms of simple correlation and multiple regressions analyses were conducted to examine whether associations exists between students' perceptions of their research-based learning strategies and their creative thinking abilities' affective outcomes with the actually correlations between students' creative thinking abilities' towards Foundational Education and designing the instructional model of the research-based learning strategies among six scales; when using a simple correlation analysis (r) and the standardized regression validity (β) are significant, relatively positive. The multiple correlations R was 0.79 and the predictive efficiency value (R^2) indicated that 62% of the variances in students' creative thinking abilities to their Foundational Education classes were attributable for their perceptions of their individualized classroom environments. The results are answered the research question 4.

This study determined how students assess the various components of their foundational education environmental classes with the instructional designs of the *Research-Based Learning Strategies* (RBLS) were checked by the professional educators in a high quality. It also identified how the foundational education classes were affected by students' learning outcomes. Findings revealed that students could assess the six components such as: Integrating research, understanding role research, generic research processes and skills, fostering environmental research, enquiry-based activity research, and pedagogic and linking research of the foundational education classes. Students' responses to their fostering environmental research have the highest assessment while generic research processes and skills have the least. The results also showed that the six components of the foundational education classes are positively correlated with students' perceptions of their creative thinking abilities, interestingly.

Limitations and suggestions

This research study designed the instructional model with the cultivating research-based learning strategies for fostering teacher students' creative thinking abilities at the Faculty of Education in Kamphaeng Phet Rajabhat University, Thailand. The form of the result of this research by applying research tools from abroad with the framework of research that includes innovation, learning plan, research tools or instruments throughout the use of advanced statistics to analyze the relationship between variables in the context of Thailand. It may be different from the context of international research. However, the research team hopes that the research methodology, research procedure, sample design of research tools and other components of this research. It will be valuable and have the highest benefit for further research.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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