

# Effects of the Instructional Model Based on Creative Problem-Solving Principles with Social Media to Promote the Creation of Educational Innovation for Pre-service Teachers

Thapanee Seechaliao<sup>1</sup> & Phamornpun Yurayat<sup>2</sup>

<sup>1</sup> Department of Educational Technology and Communications, Faculty of Education, Maharakham University, Maharakham, Thailand

<sup>2</sup> Department of Educational Psychology and Guidance, Faculty of Education, Maharakham University, Maharakham, Thailand

Correspondence: Phamornpun Yurayat, Department of Educational Psychology and Guidance, Faculty of Education, Maharakham University, Maharakham, 44000, Thailand. Tel: 66-943-636-329. E-mail: phamornpun.y@msu.ac.th

Received: May 30, 2021 Accepted: June 21, 2021 Online Published: June 30, 2021

doi:10.5539/hes.v11n3p56 URL: <https://doi.org/10.5539/hes.v11n3p56>

## Abstract

The main research purpose focused on the effects of conducting the instructional model based on the principles of creative problem solving with social media to promote the creation of educational innovation for pre-service teachers. The participants consisted of twelve pre-service teachers. Research instruments were 1) the instructional model based on the principles of creative problem solving with social media, 2) the test of knowledge and creation of educational innovation, 3) the creation of educational innovation's evaluation form, and 4) the questionnaires' conducting this instructional model. Collected data were analyzed with statistics and categorized into key issues based on literature. The results were presented through the form of Shapiro-Wilk, Wilcoxon signed-ranks test, arithmetic mean, standard deviation, and descriptive analysis. The research findings were presented as follows: 1) the effects of conducting the instructional model that was conducted sixteen weeks on the course 0537211 Innovation in Educational Technology and Communications in the first semester of 2020. The research hypothesizes were followed the established as follows; 1.1) the pre-service teachers had post-test scores' the knowledge and creation of educational innovation higher than pre-test with statistical significance at the .01 level. 1.2) they had post-learning scores for creating educational innovations' processes at the overall excellent level ( $M = 92.83$ ,  $S.D. = 11.78$ ), and their educational innovations were be post-learning at the overall good level ( $M = 48.33$ ,  $S.D. = 7.45$ ) 2) the opinions' pre-service teachers toward conducting this instructional model that they have positive opinions to this conduct at the overall excellent level ( $M = 4.92$ ,  $S.D. = 0.25$ ).

**Keywords:** conduction, creative problem solving, educational innovation, pre-service teachers, instructional model, social media

## 1. Introduction

### 1.1 Background

According to 21<sup>st</sup>-century skills that higher education needs to prepare an undergraduate student for the new global society. Especially, the framework of learning and innovation skills. In Thailand, the Royal Thai government has been launched the policy of Thailand 4.0 since 2016. In the Education aspect, the crucial purpose is to prepare the ready Thai people to create innovation (Sinlarat, 2016). Learners could create products to benefit their society and others with learning and doing skills. Then, they would be learners 4.0's characteristics that were 1) critical thinking, 2) creative thinking, 3) productive thinking, and 4) responsibility. It corresponds to learning skills in the global labor market 2020 and education in the 21<sup>st</sup> century. Therefore, teachers-lecturers 4.0 need to teach learners to be innovators efficiently that could create innovation, create new things, work with others efficiently (Waitayasin, 2019).

In Maharakham University, Thailand, pre-service teachers who studied in education programs need to be prepared for teaching in the classroom and digital learning environment. They are required to improve their abilities to design and create innovations in education. It responds to Thailand 4.0 policy and the need for 21<sup>st</sup>

Century learning skills in creativity and innovation (Faculty of Education, Maharakham University, 2016). Therefore, the instructional model needs to be redesigned to improve learners with innovative skills. Moreover, an instructional model needs to be integrated diverse technology for 21<sup>st</sup>-century skills, educational management's abilities, learners' abilities in science mathematics, and technology. Researchers need to be improved in diverse expertise to develop educational innovations. The education system in Thailand's 4.0 Era was designed to support the changed learners' behavior. Integrating a new technology could be an active learning tool and motivate learners to create innovations and research with science and technology to enhance the competitions' abilities of the country (Janpirom, Kunlaya, Roungrong, & Kaewurai, 2019).

Seechaliao (2018) developed the instructional model which was a systematic teaching and learning plan and showed guidelines for teaching and learning management. The model could organize the teaching and learning processes to support learners achieve their objectives. This model was called the instructional model based on the principles of creative problem solving with social media to promote the creation of educational innovation for pre-service teachers. This model was including 1) Principle, 2) Learning objective, 3) Crucial components, and 4) Main steps and sub-steps which designed on principles of creative problem-solving. There were understanding the challenge, gathering ideas, preparing for action, planning your approach, creating innovations, and diffusing innovations. Additionally, applying social media to organize activities at every stage. This instructional model was evaluated and verified by experts. The five experts concluded that this model was suitable at a very good level ( $M = 4.00$ ,  $S.D. = 0.00$ ). It could realistically be conducted in a real situation.

Although the instructional system or instructional model was completely created, it didn't mean that was effective. The instructional system needs to be implemented or used in real situations. Then, study the happen results that should be achieved the goals or nearly goals. The implemented results would be a benefit to improve the system more effectively. Therefore, implementation or usage in real situations was important (Khemmani, 2016). Researchers were interested in studying the effect of using the instructional model based on the principles of creative problem solving with social media in real situations. It could be approved that this model was effective in order to promote the creation of educational innovation for pre-service teachers.

## 2. Research Method

The research used a pre-experimental design with one group pretest-posttest design pattern (Kaemkate, 2012) as follow:

### 2.1 Research Objectives

- to study the effect of conducting the instructional model based on the principles of creative problem solving with social media.
- to study the opinion levels' pre-service teachers toward this instructional model's conduct.

### 2.2 Research Hypothesis

- The pre-service teachers who studied the course that was followed the instructional model based on the principles of creative problem solving with social media had post-learning scores for the knowledge and creation of educational innovation higher than pre-test with statistical significance at the .01 level.
- They had post-learning scores for the creation of educational innovation at the overall good level at least.

### 2.3 Participants

The participants for this study consisted of twelve pre-service teachers who were enrolling in the course 0537211 Innovation in Educational Technology and Communications in the first semester of the Academic Year 2020. Then, they continuously studied for sixteen weeks.

### 2.4 Research Instruments

There were four research instruments as followed:

a) The instructional model is based on the principles of creative problem solving with social media to promote the creation of educational innovation for pre-service teachers that was developed by Seechaliao (2018). This model was including 1) Principle, 2) Learning objective, 3) Crucial components, and 4) Main steps and sub-steps which designed on principles of creative problem-solving. The main steps were followed; understanding the challenge, gathering ideas, preparing for action, planning your approach, creating innovations, and diffusing innovations. Each step was applied suitable functions of social media to organize activities. The lecturer needs to select the appropriate social media for learning activity in each step.

Three groups of social media were managed for usage characteristics as followed:

1) Group of knowledge and information base 1.1) Handout such as Google Drive (Instructor), 1.2) Examples such as YouTube, Pinterest, Blog, Slideshare, and 1.3) Case such as YouTube, Pinterest, Blog, Slideshare

2) Group of activity 2.1) Control Class such as Classdojo, 2.2) Communication and Brainstorming such as Facebook Group, Mind Map, Google docs, Linoit (Sticky notes), 2.3) Search Information and reference such as Google Search, Social Bookmarking, 2.4) Job Planning such as Time Toast (Timeline Maker), 2.5) Presentation such as Facebook Group, Blog, Slideshare, YouTube, Flickr, and 2.6) Portfolio such as Google Drive (Student)

3) Group of evaluation 3.1) Evaluation Form such as Google Form

This instructional model was evaluated and verified by five experts. This model was suitable at a very good level ( $M = 4.00$ ,  $S.D. = 0.00$ ) that was the highest evaluates' level. It could realistically be conducted in a real situation.

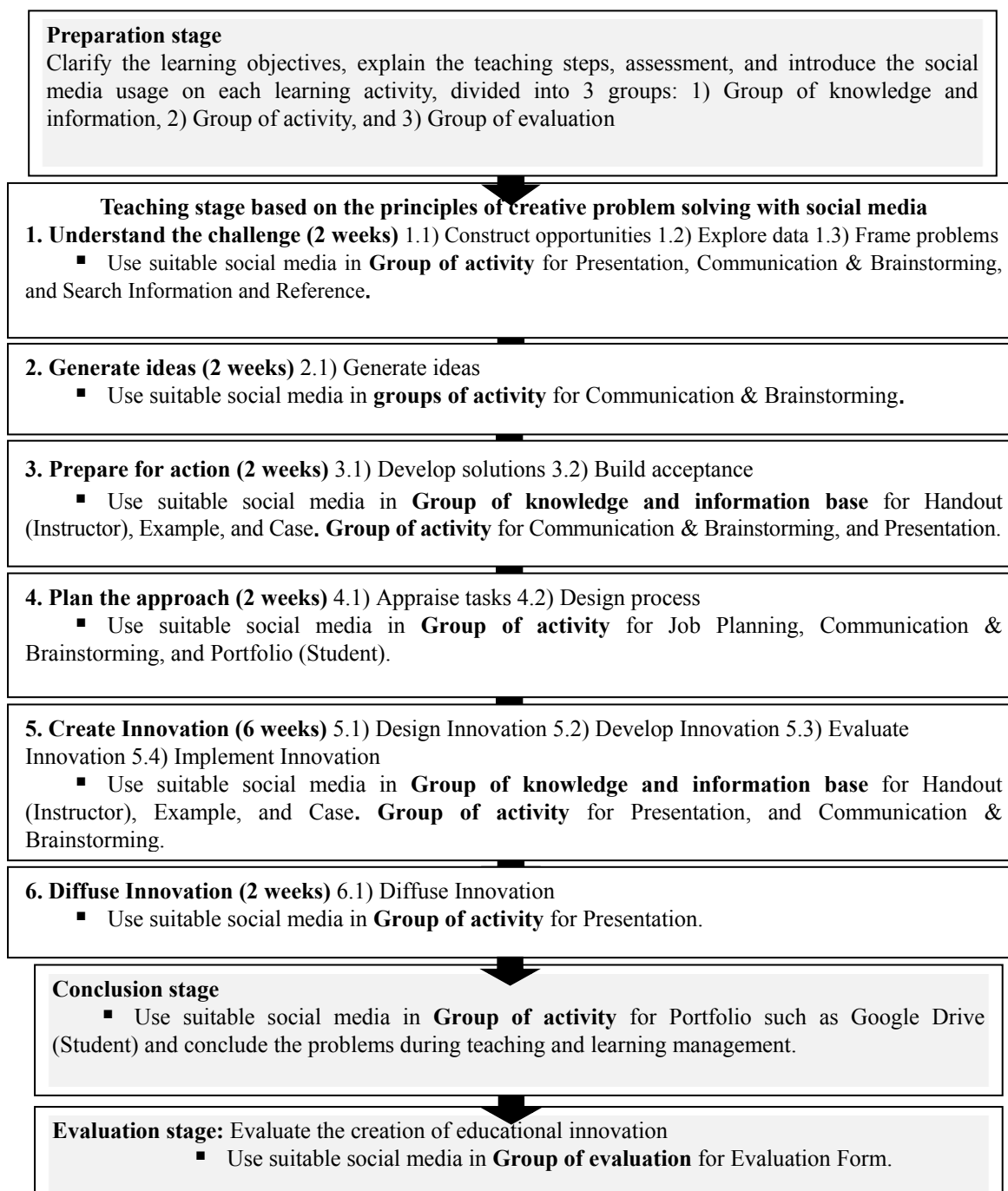


Figure 1. The important steps on this instructional model

b) The test of knowledge and creation of educational innovation that was constructed based on literature. There were six key issues as follows: 1) Knowledge and understanding about educational innovation, 2) the processes of creation of educational innovation, 3) Computer programs for creation of educational innovation, 4) Social media to support designing and developing educational innovation, 5) Evaluation of educational innovation, and 6) Diffusion of educational innovation. The rubric scoring was constructed in analytic score style to rate with criteria, knowledge levels/understanding level. This instrument was using the index of item-objective congruence (IOC) measure (Rovinelli & Hambleton, 1977). The seven experts measured and the IOC values ranged from 0.71 to 1.00 that indicated this instrument was suitable for conducting the study. The instrument was pilot tested with three students from Mahasarakham University in Thailand. The test was conducted in pre-test and post-test.

c) The creation of educational innovation's evaluation form that was constructed based on literature. The key issues and themes were divided into two main parts. The first part, the creating educational innovations' processes include six processes as follows: 1) understanding the challenge, 2) gathering ideas, 3) preparing for action, 4) planning the approach, 5) creating innovations, and 6) diffusing innovations. The second part, the educational innovations include three dimensions as follows: 1) novelty 2) resolution, and 3) elaboration and synthesis. The rubric scoring was constructed in analytic score style to rate with criteria, performance levels/quality level (Kultawanich, 2018; Wongtapha & Songkram, 2019; Chaiyasit & Somphong, 2020; Vibulchai, Anekwit, Taiwong, Saenchan, & Bundittharwon, 2020). This instrument was using the index of item-objective congruence (IOC) measure (Rovinelli & Hambleton, 1977). The seven experts measured and the IOC values ranged from 0.71 to 1.00 that indicated this instrument was suitable for conducting the study. The instrument was pilot tested with three lecturers from Mahasarakham University in Thailand.

d) The questionnaires' conducting this instructional model that was constructed based on literature. There were ten key issues as follows: 1) The instructional model's conduct, 2) Social media, 3) Contents, 4) Teaching techniques, 5) The teacher and student's roles, 6) Time duration, 7) Instructional media or learning resources, 8) Learning environment, 9) The evaluation of the creation of educational innovation, and 10) The diffusion of educational innovation. The rating scales were constructed to rate with good to bad Likert scales (Kultawanich, 2018; Wongtapha & Songkram, 2019; Chaiyasit & Somphong, 2020). There were five Likert scales as follows: (1) Very poor, (2) Poor, (3) Average, (4) Good, and (5) Excellent. This instrument was using the index of item-objective congruence (IOC) measure (Rovinelli & Hambleton, 1977). The seven experts measured and the IOC values ranged at 1.00 that indicated this instrument could conduct the study. The instrument was pilot tested with three students from Mahasarakham University in Thailand.

### *2.5 Data Collection*

The lecturer has been conducting this instructional model for sixteen weeks on the course 0537211 Innovation in Educational Technology and Communications in the first semester of 2020. Twelve pre-service teachers who were enrolling in this course had to finish all activities and continuously studied for sixteen weeks. Time Duration was spent both in the classroom and online from July 2020 to November 2020. Data was collected with research four instruments as followed: 1) the instructional model based on the principles of creative problem solving with social media that was conducted for sixteen weeks, 2) the test of knowledge and creation of educational innovation that was conducted for pre-test and post-test, 3) the creation of educational innovation's evaluation form that was conducted for post-learning, and 4) the questionnaires' conducting this instructional model that was conducted for post-learning.

### *2.6 Data Analysis*

Collected data were analyzed with statistics and categorized into key issues based on literature. The results were presented through the form of Shapiro-Wilk, Wilcoxon signed-ranks test, arithmetic mean, standard deviation, and descriptive analysis.

### *2.7 Ethical Considerations*

This research study was approved by the Human Research Ethics Committee of Mahasarakham University (No.160/2020), issued on 15 June 2020. All data were kept confidential.

## **3. Findings**

These research results were divided into 2 parts as follows:

### 3.1 The Effect of Conducting the Instructional Model Based on the Principles of Creative Problem Solving with Social Media

This instructional model has been conducted for sixteen weeks on the course 0537211 Innovation in Educational Technology and Communications in the first semester of 2020. Twelve undergraduate students who were enrolling in this course had to finish all activities and continuously studied for sixteen weeks. Time Duration was spent both in the classroom and online from July 2020 to November 2020. Lecturer conducted this instructional model with research instruments. There were four instruments as followed: 1) the instructional model based on the principles of creative problem solving with social media, 2) the test of knowledge and creation of educational innovation, 3) the creation of educational innovation's evaluation form, and 4) the questionnaires' conducting this instructional model.

The lecturer needs to explain how to study with this instructional model for the first time and also the main learning objective that focused on the creation of educational innovation. Moreover, the lecturer needs to select the appropriate social media for learning activity in each step. Three groups of social media were managed for usage characteristics as followed: 1) Group of knowledge and information base 2) Group of activity 3) Group of evaluation

Figure 2 to figure 12 showed the partial activities on this instructional model as follow:



Figure 2. The brainstorming activity in the classroom to exchange opinions

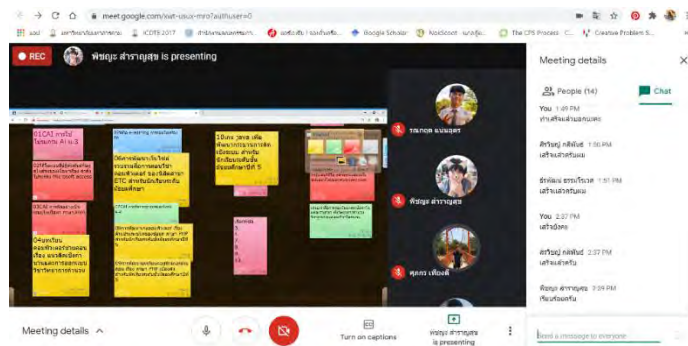


Figure 3. The online activity with diverse social media and technology to share the idea



Figure 4. The interviewing instructional problem in school to create educational innovation

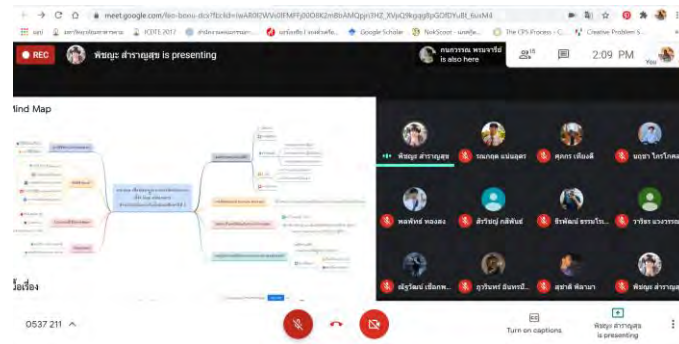


Figure 5. The online activity with diverse social media and technology to present contents' scope



Figure 6. The computer program to create educational innovation

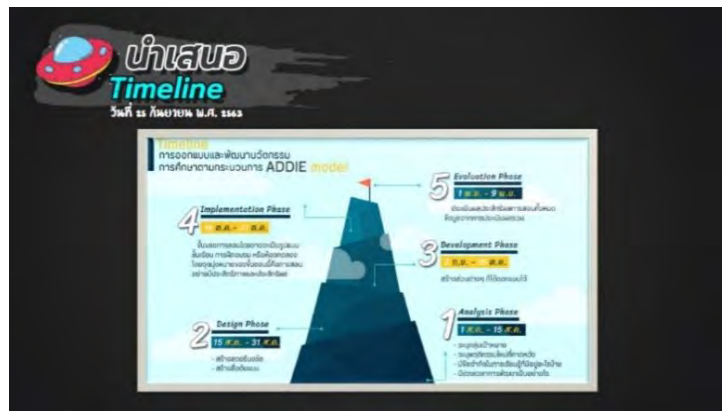


Figure 7. Schedule to create educational innovation

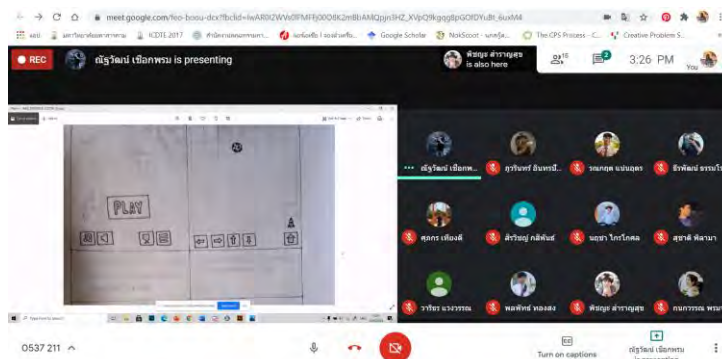


Figure 8. The storyboard to create educational innovation

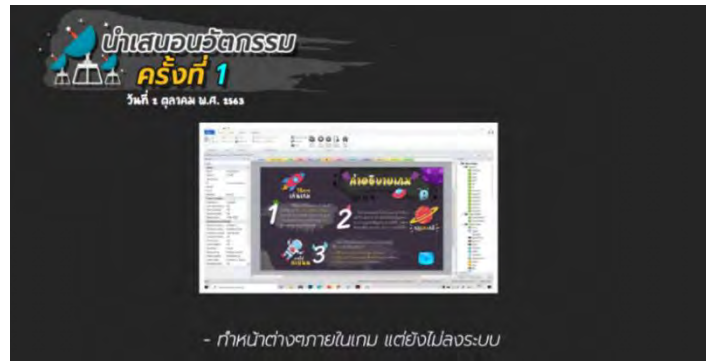


Figure 9. The first presentation to improve the educational innovation

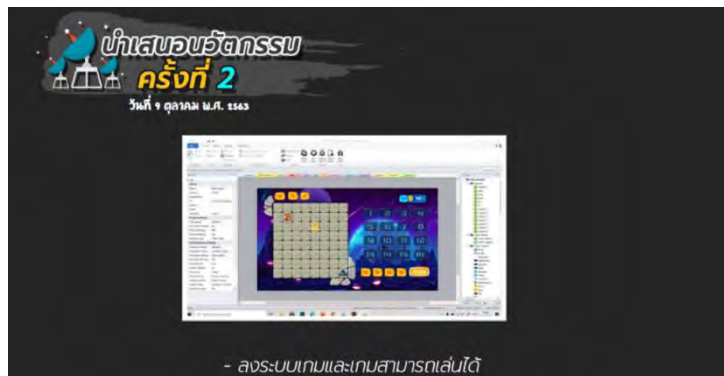


Figure 10. The second presentation to progress the educational innovation

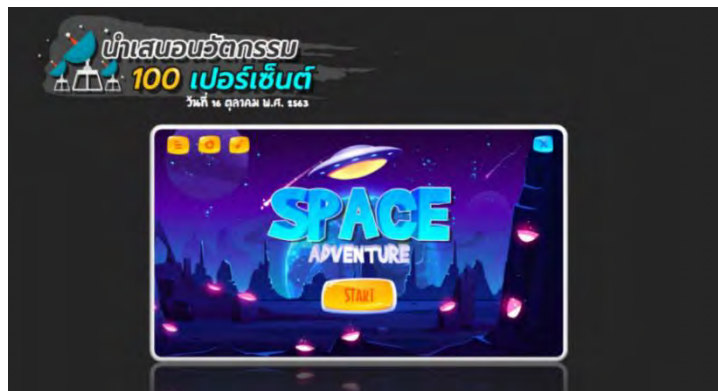


Figure 11. The presentation of the completely educational innovation



Figure 12. The educational innovation testing in school and diffusion

3.1.1 The Result of the Knowledge and Creation of Educational Innovation Testing Scores' Pre-service Teachers Were As Follows

a) the result of the knowledge and creation of educational innovation testing scores' pre-service teachers against criteria.

The knowledge and creation of educational innovation testing scores' pre-service teachers both in pre-test and post-test that was tested with the Shapiro-Wilk statistical test for normality as table 1:

Table 1. The result of the normal distribution test of pre-test and post-test scores' pre-service teachers

|                | Phase     | Shapiro-Wilk |    |      |
|----------------|-----------|--------------|----|------|
|                |           | Statistic    | df | Sig. |
| Testing scores | Pre-test  | .841         | 12 | .028 |
|                | Post-test | .806         | 12 | .011 |

Note. df = degrees of freedom; Sig. = Significance

Table 1 the result showed the distribution of information was not a normal curve (Shapiro-Wilk's P-value was less than .05). Testing the difference between the two independent groups and the distribution of information was not a normal curve. Therefore, the Wilcoxon signed-ranks test was used.

The knowledge and creation of educational innovation testing scores' pre-service teachers both in pre-test and post-test that was compared with the Wilcoxon signed-ranks test as table 2:

Table 2. the comparison's result of the arithmetic mean between pre-test and post-test scores' pre-service teachers

| Testing scores | Full score | M      | S.D.  | Wilcoxon signed-rank test |        |
|----------------|------------|--------|-------|---------------------------|--------|
|                |            |        |       | Z                         | p      |
| Pre-test       | 30         | 8.500  | 3.873 | -3.064                    | .002** |
| Post-test      | 30         | 24.958 | 3.180 |                           |        |

\*\*p < .01

Note. M = Mean; S.D. = Standard Deviation; Z = Wilcoxon signed rank test; p = p-value

Table 2 the result showed the pre-service teachers had post-test scores' the knowledge and creation of educational innovation higher than pre-test with statistical significance at the .01 level.

3.1.2 The Result of the Creating Educational Innovation Scores' Pre-service Teachers were Two Aspects as Follows:

a) the result of the creating educational innovations' processes based on the principles of creative problem solving with social media against criteria

Table 3. The arithmetic mean and standard deviation of the creating educational innovation scores' pre-service teachers after the experiment in overall

| The creating educational innovation scores | Full score | M     | S.D.  | The creating educational innovation level against criteria |
|--|------------|-------|-------|--|
| Post-learning                              | 120        | 92.83 | 11.78 | Excellent  |

Note. M = Mean; S.D. = Standard Deviation

Table 3 result showed the pre-service teachers had post-learning scores for creating educational innovations' processes that were at the overall excellent level (M = 92.83, S.D. = 11.78) This result was followed the established research hypothesis.



Table 4. The arithmetic mean and standard deviation of the creating educational innovation scores' pre-service teachers in each process

| <b>The creating educational innovation scores</b> | <b>Full score</b> | <b>M</b> | <b>S.D.</b> | <b>The creating educational innovation level against criteria</b> |
|---|-------------------|----------|-------------|---|
| 1) Understanding the challenge                    | 24                | 19.33    | 0.98        | Excellent   |
| 2) Gathering ideas                                | 8                 | 5.66     | 0.77        | Good  |
| 3) Preparing for action                           | 16                | 13.33    | 1.30        | Excellent   |
| 4) Planning the approach                          | 16                | 10.33    | 2.22        | Good  |
| 5) Creating innovations                           | 52                | 40.91    | 7.78        | Excellent   |
| 6) Diffusing innovations                          | 4                 | 3.25     | 0.62        | Excellent   |

Note. *M* = Mean; *S.D.* = Standard Deviation

Table 4 the result showed the pre-service teachers had post-learning scores for creating educational innovations' processes in each process were as followed: 1) Understanding the challenge was at an excellent level ( $M = 21.33$ ,  $S.D. = 0.98$ ) 2) Gathering ideas were at a good level ( $M = 5.83$ ,  $S.D. = 0.57$ ) 3) Preparing for action was at an excellent level ( $M = 13.66$ ,  $S.D. = 1.54$ ) 4) Planning the approach was at a good level ( $M = 10.33$ ,  $S.D. = 2.22$ ) 5) Creating innovations was at excellent level ( $M = 40.91$ ,  $S.D. = 7.78$ ) 6) Diffusing innovations was at excellent level ( $M = 3.25$ ,  $S.D. = 0.62$ )

b) the result of the educational innovations' evaluation against criteria

Table 5. The arithmetic mean and standard deviation of the educational innovation scores' pre-service teachers after the experiment in overall

| <b>The educational innovation scores</b> | <b>Full score</b> | <b>M</b> | <b>S.D.</b> | <b>The educational innovation level against criteria</b> |
|--|-------------------|----------|-------------|--|
| Post-learning                            | 72                | 48.33    | 7.45        | Good   |

Note. *M* = Mean; *S.D.* = Standard Deviation

Table 5 result showed the pre-service teachers had post-learning scores for the educational innovations' evaluation that was at the overall good level ( $M = 48.33$ ,  $S.D. = 7.45$ ). This result was followed the established research hypothesis.

Table 6. The arithmetic mean and standard deviation of the educational innovation scores' pre-service teachers in each dimension

| <b>The educational innovation scores</b> | <b>Full score</b> | <b>M</b> | <b>S.D.</b> | <b>The educational innovation level against criteria</b> |
|--|-------------------|----------|-------------|--|
| 1) Novelty                               | 18                | 9.00     | 4.30        | Moderate   |
| 2) Resolution                            | 18                | 12.83    | 1.58        | Good   |
| 3) Elaboration and synthesis             | 36                | 26.50    | 3.08        | Good   |

Note. *M* = Mean; *S.D.* = Standard Deviation

Table 6 the result showed the pre-service teachers had post-learning scores for the educational innovations' evaluation in each dimension were as followed: 1) Novelty was at a moderate level ( $M = 9.00$ ,  $S.D. = 4.30$ ) 2) Resolution was at a good level ( $M = 12.83$ ,  $S.D. = 1.58$ ), and 3) Elaboration and synthesis was at a good level ( $M = 26.50$ ,  $S.D. = 3.08$ )

### 3.2 The Result of Studying the Opinion Levels' Pre-Service Teachers toward to This Instructional Model's Conduct

#### 3.2.1 General Information regarding the Respondents

The respondents consisted of twelve pre-service teachers who were enrolling on the course 0537211 Innovation in Educational Technology and Communications in the first semester of the Academic Year 2020. The respondents had to finish all activities and continuously studied for sixteen weeks. General information, they were second years' pre-service teachers who studied in the Bachelor of Education Program in Educational Technology and Computer Education, Maharakham University in Thailand. All twelve pre-service teachers completed the questionnaires and expressed their opinions toward this instructional model's conduct.

### 3.2.2 The Result of Studying the Opinion Levels' Pre-service Teachers toward This Instructional Model's Conduct

Table 7. The arithmetic mean and standard deviation of the opinion scores' pre-service teachers toward to this instructional model's conduct after the experiment

| Pre-service teachers' opinions   | M    | S.D.  | The opinion level against criteria |
|--|------|-------|------------------------------------|
| 1) This instructional model's conduct was completely all learning objectives.  | 4.90 | 0.316 | Excellent                          |
| 2) Social media were applied in each activity that could promote learning and encourage the creation of educational innovation.  | 4.90 | 0.316 | Excellent                          |
| 3) Contents could support the creation of educational innovation. Contents covered the course description and all learning objectives.   | 4.90 | 0.316 | Excellent                          |
| 4) Teaching techniques could support the creation of educational innovation. Techniques could motivate learning in each step that would enhance higher-order thinking.   | 5.00 | 0.00  | Excellent                          |
| 5) The teacher and student's roles could support the creation of educational innovation. Students had a chance to questions, express their opinions. The teacher always answered the questions, reflected their opinions, and facilitated their learning.  | 4.90 | 0.316 | Excellent                          |
| 6) Time duration was enough for creating educational innovation. Students could completely create educational innovation and diffuse these innovations in time.  | 4.90 | 0.316 | Excellent                          |
| 7) Instructional media or learning resources could support the creation of educational innovation. The teacher used interesting media covering the course. It could motivate learning and understanding the contents. The teacher always recommended the diverse learning resources to study more. | 4.90 | 0.316 | Excellent                          |
| 8) Learning environment could support the creation of educational innovation. Teachers connected the knowledge or crucial skills to apply in daily life.   | 5.00 | 0.00  | Excellent                          |
| 9) The evaluation of the creation of educational innovation. The teacher explained how to evaluate and the criteria.   | 4.90 | 0.316 | Excellent                          |
| 10) The diffusion of educational innovation. Students could diffuse their educational innovations in diverse communication channels. It could use in real situations.  | 4.90 | 0.316 | Excellent                          |
| Overall  | 4.92 | 0.252 | Excellent                          |

Note. *M* = Mean; *S.D.* = Standard Deviation

Table 7 the result showed the pre-service teachers had positive opinions about this conduct at the overall excellent level ( $M = 4.92$ ,  $S.D. = 0.252$ ). Moreover, all pre-service teachers could create their educational innovations in time. They were appreciated learning in real situations, thinking creatively, and proud of themselves.

#### 4. Discussion

According to this research results, the instructional model based on the principles of creative problem solving with social media could promote the creation of educational innovation for pre-service teachers effectively. There were two main points for discussion as follow:

##### 4.1 The Pre-service Teachers Who Studied the Course That Was Followed This Instructional Model Had Post-test Scores' The Knowledge and Creation of Educational Innovation Higher Than Pre-test

They had post-learning scores for creating educational innovations' processes at the overall excellent level. Their educational innovations were be post-learning at the overall good level. This is because this instructional model was evaluated and verified by five experts that were suitable at a very good level. It could realistically be conducted in a real situation (Seechaliao, 2018). The crucial activities in this instructional model that was designed based on the principles of creative problem solving were similar principles to previous researches. The principles affecting the design and creation product for undergraduate students such as Problem-based learning (Tannirat, 2017; Liangpanit, 2018), Blended-learning (Kultawanich, 2018; Wongtapha & Songkram, 2019),

Designed-based (Kultawanich, 2018; Wongtapha & Songkram, 2019; Ekthamasuth, Sawekngam & Prachusilpa, 2020), and Creative problem solving (Chaiyasit & Somphong, 2020).

In Addition, using appropriate social media could spark the idea to design and develop their educational innovation creatively, different from previously. These results are similar to Seechaliao (2021) explained that social media support creativity, innovation, and networked connections in higher education. For better quality learning outcomes, instructors need to design appropriate teaching and learning strategies to guide students to create new ideas and diverse solutions for solving different problems in various situations. Also, selecting appropriated social media were important that need to fit with the learning content, teaching strategies, learning activities, and instructional model. It could encourage and motivate students learning. Then, students could think creatively and create innovation. It was similar to previous research results that found lots of social media and technology as instructional tools. It could promote the design and creation of products for undergraduate students effectively such as Online social media (Kultawanich, 2018), Social networks (Thanachawengsakul & Jeerungsuwan, 2018), Cloud computing technology (Thanachawengsakul & Jeerungsuwan, 2018), Digital learning management (Liangpanit, 2018). The new finding in this research found that most students used the Discord platform to communicate and discuss with programmers and gamers to solve problems in creating educational innovation. This result is similar to Acar, Neumayer, and Burnett (2019) that explored using social media influence on ideational behavior and creative activity. Social media users who usually study and learn by themselves, expressed their idea, collect data for discussion, discuss an interesting topic. They could be positive ideational behavior and creative activity. Specifically, social media platform supporting two ways interactions which could cause novel ideas, new projects. Bouton, Tal, and Asterhan (2021) found that students in secondary schools used social network technology (SNT) mainly for knowledge sharing of study-related artifacts. Undergraduate university programs and teacher training colleges also used SNTs extensively for uploading, linking, and downloading study-related artifacts in peer-directed SNT groups. They deem that using SNT could improve their academic achievements, have positive attitudes for sharing, collected value orientations, motivated by prosocial reasons, and less competitive study. Joan (2020) explained that in the educational process, social media was accountable for sharing notes from one learner to another, teacher to student, subject expert to the teacher, authorized committee to School, etc. Sharing notes through social media saves time in the class and also reduces the printing cost of materials. It influences social media in the progress of learning. Hamadi, El-Den, Sriratanaviriyakul, and Azam (2020) found that higher education classrooms widely adopted social media as pedagogical instruments. Facebook and YouTube were most selected to teach and communicate in classrooms. Dragseth (2020) found that social media can make students more engaged and also make professional networks and colleagues, develop social skills. The social media benefits provided lots of opportunities in the classroom. Twitter and Facebook were used in this study. Additionally, Chugh, Grose, and Macht (2021) found that higher education academics have a positive opinion of social media usage. Social media was various benefits to increase communication with others and colleagues in the future without physical or geographical barriers. It could make students more satisfied. Aldosemani (2019) described that integrating technology is more crucial for teachers who facilitate their students achieved learning objectives. Thus, selecting suitable technology tools was challenging and, blended technology with traditional teaching strategy is more needed.

As these research results, this instructional model was empirically approved to be effective. That is the concept of khemmani (2016) who explained that studying the effects of the instructional model was to prove, verify, and empirical approved. If the instructional model could accomplish the models' goal, that meant the instructional model would be effective. It is also based on the ADDIE model that is a generic instructional design model with five phases: analysis, design, development, implementation, and evaluation. The last two phases are crucial to validate the model. Moreover, previously related researches showed that design and development instructional models mostly were conducted or implemented in the real situation then, study the effects of the instructional model. This research is similar to other related researches that study the instructional model with a specific goal. It emphasized thinking skills' development, products' design and creation for undergraduate students after that, studied the effects of the instructional model to approve (Tannirat, 2017; Liangpanit, 2018; Chidnayee & Kaewurai, 2018; Wongtapha & Songkram, 2019; Chaiyasit & Somphong, 2020; Vibulchai, Anekwit, Taiwong, Saenchan & Bundittharwon, 2020; Saenab, Zubaidah, Mahanal & Lestari, 2021; Yen, Tu, Ozkeskin & Sujo-Montes, 2021).

In the second part of the creation of educational innovation's evaluation. These educational innovations include three dimensions as follows: 2.1) novelty, 2.2) resolution, and 2.3) elaboration and synthesis. The results indicated that novelty was at only a moderate level. This is because this instructional model was conducted in the

course for the second-year pre-service teachers. These pre-service teachers may have not enough knowledge and experience to create educational innovation. This result is similar to Kwunsakul (2021) that second-year undergraduate students don't have much knowledge and skills for media designing. In addition, the main goal of educational innovation is to solve instructional problems, help students learning better. It should be better that pre-service teachers would complete the prerequisite courses; they would design and create educational innovation more quality and could get the idea to create new products more novelty. Therefore, the prerequisite courses are important. They should complete this course first such as CAI (Computer Assisted Instruction), WBI (Web-based Instruction), Virtual Reality (VR), Artificial Intelligence (AI), Robot, Digital game, Mobile application, etc. For better learning outcomes, it may conduct this model with third-year pre-service teachers at least because they might have enough accumulated experience and creativity to think more innovatively.

#### *4.2 The Pre-service Teachers have Positive Opinions toward this Conduct at the Overall Excellent Level*

These results are similar to previous research that usually was high level after learning with the instructional model (Kultawanich, 2018; Wongtapha & Songkram, 2019; Chaiyasit & Somphong, 2020). This is because this instructional model was designed and developed which focused on student-centered activities. The learning activities support changeable learning styles and students' behaviors in the digital age. Pre-service teachers were appreciated learning in a real situation that they could communicate with teachers, students, and others. They could meet the real learning environment etc. Then, they could deeply know instructional problems in school which make them appreciate learning. The features and benefits of social media support an individual's learning activities to communicate with other experts, not only in the class but also online via social media. Especially, whenever they faced computer programming problems during creating the educational innovation, they could solve the problems by themselves. For example, they found computer programming problems to create the educational game, they could find a solution and consult programmers via social media such as Discord. Then, they could think creatively, and completely create their educational innovations in time. It makes them proud of themselves. Moreover, Oh, Chan, and Kim (2020) found that social media and E-portfolios (Electronic portfolios) impacted students' motivation through Project-based learning. During learning and working on projects, a student can access social media to communicate with peers, teachers, and others more quickly. Hence, they could improve their learning outcomes and, achieve their project. The benefit of social media platforms such as Facebook could increase students' motivation. Eleven indicators were used to measure motivation as followed: autonomy, confidence, eagerness to learn, high performance, independence, enjoyment, self-efficacy, sense of achievement, sense of belonging, sense of engagement, and sympathy. Moreover, Syzdykova, Koblandin, Mikhaylova, and Akinina (2021) found that the assessment of the E-portfolio was suitable for higher education and integrated learning. Students could create their E-portfolio, manage the working documents, catch up with their learning progress, illustrate related learning concepts.

## **5. Conclusion**

The results of this research show that the instructional model based on the principles of creative problem solving with social media could promote the creation of educational innovation for pre-service teachers effectively. The creation of educational innovation could connect to Twenty-first-century skills, Thailand 4.0 policy. Social network usage skills were working during the COVID-19 outbreak. However, instructors should update social media more often to select and design appropriate social media for learning activities and support changeable learning styles and students' behaviors in the next normal.

## **Acknowledgments**

This research was funded by the research scholarship for the Faculty of Education academic staff, Annual Income Budget 2020 Mahasarakham University.

## **References**

- Acar, S., Neumayer, M., & Burnett, C. (2019). Social Media Use and Creativity: Exploring the Influences on Ideational Behavior and Creative Activity. *The Journal of Creative Behavior*, 55(1), 39-52. <https://doi.org/10.1002/jocb.432>
- Aldosemani, T. (2019). Inservice Teachers' Perceptions of a Professional Development Plan Based on SAMR Model: A Case Study. *TOJET: The Turkish Online Journal of Educational Technology*, 18(3), 46-53.
- Bouton, E., Tal, S. B., & Asterhan, C. S. (2021). Students, social network technology and learning in higher education: Visions of collaborative knowledge construction vs. the reality of knowledge sharing. *The Internet and Higher Education*, 49, 100787. <https://doi.org/10.1016/j.iheduc.2020.100787>
- Chaiyasit, S., & Somphong, N. (2020). Development of creative problem-solving learning model on intelligence

- instructional innovation system to enhance creative thinking skill of undergraduate students. *NRRU Community Research Journal*, 14(2), 148-162.
- Chidnayee, S., & Kaewurai, W. (2018). The development of an instructional model based on cognitive apprenticeships to enhance critical thinking in nursing process abilities for nursing students. *Journal of Education Naresuan University*, 20(4), 191-205.
- Chugh, R., Grose, R., & Macht, S. A. (2021). Social media usage by higher education academics: A scoping review of the literature. *Education and Information Technologies*, 26, 983-999. <https://doi.org/10.1007/s10639-020-10288-z>
- Dragseth, M. R. (2020). Building Student Engagement Through Social Media. *Journal of Political Science Education*, 16(2), 243-256. <https://doi.org/10.1080/15512169.2018.1550421>
- Ekthamasuth, C., Sawekngam, W., & Prachusilpa, G. (2020). Development of instructional model based on design thinking and reflective practice approaches to enhance nursing innovation abilities of nursing students. *Journal of Health and Nursing Research*, 36(2), 1-14.
- Faculty of Education, Mahasarakham University. (2016). *Education curriculum. Mahasarakham*. Mahasarakham: Mahasarakham University.
- Hamadi, M., El-Den, J., Sriratanaviriyakul, N. C., & Azam, S. (2020). A social media adoption framework as pedagogical instruments in higher education classrooms. *E-Learning and Digital Media*, 18(1), 55-85. <https://doi.org/10.1177/2042753020950869>
- Joan, D. R. (2020). Influence of Social Media in the Progress of Learning. *Journal on School Educational Technology*, 16(2), 31-38. <https://doi.org/10.26634/jesch.16.2.17094>
- Janpirom, N., Kunlaya, S., Roungrong, P., & Kaewurai, R. (2019). Educational technology within Thailand 4.0. *Panyapiwat Journal*, 11(1), 304-314.
- Kaemkate, W. (2012). *Research methodology in behavioral sciences* (3rd ed.). Bangkok: Chulalongkorn University Press.
- Khemmani, T. (2016). *Teaching science: knowledge for effective learning process management* (20th ed.). Bangkok: Chulalongkorn University Press.
- Kultawanich, K. (2018). A blended learning model via using a social media using design process with use of a dummy to enhance the visual design abilities for students in the communication arts program. *Journal of Education Studies, Chulalongkorn University*, 46(1), 1-17.
- Kwunsakul, K. (2021). The Integration of Instruction with Design Thinking Process to Develop Media innovation, O-Top Tourism Community Project, Ban Wang Yao, Keng Subdistrict, Muang District, Maha Sarakham Province. *Journal of Education, Prince of Songkla University, Pattani Campus*, 32(1), 164-184.
- Liangpanit, S. (2018). Digital learning model by problem-based learning in Thailand age 4.0. *Panyapiwat Journal*, 10(Special Issue), 208-224.
- Oh, J. E., Chan, Y. K., & Kim, K. V. (2020). Social Media and E-Portfolios: Impacting Design Students' Motivation Through Project-Based Learning. *IAFOR Journal of Education*, 8(3), 41-58. <https://doi.org/10.22492/ije.8.3.03>
- Rovinelli, R. J., & Hambleton, R. K. (1977). On the use of content specialists in the assessment of criterion-referenced test item validity. *Dutch Journal of Educational Research*, 2, 49-60.
- Saenab, S., Zubaidah, S., Mahanal, S., & Lestari, S. R. (2021). ReCODE to Re-Code: an instructional model to accelerate students' critical thinking skills. *Educ. Sci.*, 11(1), 1-14. <https://dx.doi.org/10.3390/educsci11010002>
- Seechaliao, T. (2018). *Instructional model based on creative problem-solving principles with social media to promote the creation of educational innovation for pre-service teachers*. Faculty of Education, Mahasarakham University.
- Seechaliao, T. (2021). Social media's support for creativity, innovation, and networked connections in higher education: A Thai perspective. In P. G. Nixon, V. P. Dennen & R. Rawal (Eds.), *Reshaping International Teaching and Learning in Higher Education Universities in the Information Age* (pp.121-131). London: Routledge. <https://doi.org/10.4324/9780429278075-9>
- Sinlarat, P. (2016). *Education 4.0 is more than education* (3rd ed.). Bangkok: Chulalongkorn University Press.

- Syzdykova, Z., Koblandin, K., Mikhaylova, N., & Akinina, O. (2021). Assessment of E-Portfolio in Higher Education. *International Journal of Emerging Technologies in Learning (iJET)*, Kassel, Germany, 16(2), 120-134. <https://doi.org/10.3991/ijet.v16i02.18819>
- Tannirat, T. (2017). *Development of an instructional model by integrating information problem solving, scaffolding and Z TO A approach for creative product development*. Chulalongkorn University Intellectual Repository (CUIR). Retrieved from <http://cuir.car.chula.ac.th/handle/123456789/59708>
- Thanachawengsakul, N., & Jeerungsuwan, N. (2018). Instructional model of MIAP on cloud computing technology of the undergraduate students in order to promote 21<sup>st</sup> century learning skills. *Journal of Education Naresuan University*, 20(4), 58-69.
- Vibulchai, N., Anekwit, N., Taiwong, A., Saenchan, M., & Bundittharwon, K. (2020). Development of a clinical instructional model using a research-based approach to enhance the ability in creating nursing innovation for nursing students. *Journal of Nursing and Education*, 13(2), 77-92.
- Waitayasin, P. (2019). “Change” learner to be innovator is new educational innovation in education 4.0 era. *Education and Communication Technology (ECT Journal)*, 14(17), 37-51.
- Wongtapha, P., & Songkram, N. (2019). Development of blended learning model with design thinking and TRIZ principles to enhance engineering problem solving skills of engineering undergraduate students. *Journal of Engineering, RMUTT, Rajamangala University of Technology Thanyaburi*, 17(2), 37-47.
- Yen, C. J., Tu, C. H., Ozkeskin, E. E., & Sujo-Montes, L. E. (2021). Self-regulated learning skills as the predictors for the positive perception of the online accelerated instruction learning experiences. *International Journal of Innovation and Learning*, 29(2), 129-153. <https://doi.org/10.1504/IJIL.2021.112997>

### Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).