Creative problem solving in climate change geography learning activity for primary school education via social media

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Abstract. The paper aimed to clarify the developing instructional framework for creative problem solving (CPS) in climate change geography learning activity for primary school education via social media. The social media will be provided to engage students’ creative problem solving to identify and anticipate climate change geographical differentiation in potential impacts and vulnerability. The CPS climate change geography via social media was provided regarding on the five steps framework. This included 1) fact finding, 2) problem finding, 3) idea finding, 4) solution finding, and 5) acceptance finding. These CPS tasks for primary school students would enhance students to develop idea finding explicitly embedded and scaffolded fact finding, problem finding, idea finding, solution finding, and acceptance finding. The paper will discussed learning activities regarding on the 5 steps of CPS framework, strength point of the CPS climate change geography learning, and teachers’ role to facilitate students for the CPS.

Keywords: creative problem solving, climate change, geography, primary school education

1. Introduction
Geography is about the earth’s surface, landscapes, people with locations, and people’s material and cognitive environments. The geography study the physical and social world that impact to people. The study of geography could include the intertwined processes of “global change” and globalization, and relationships between the environment, culture and economy, resource management and sustainability, urban development and business development, or political ecology and vulnerability. The themes of 21st century about global challenges (e.g. climate change, scarcity of resources, food security or the energy transition) could be studied as geography. The geography is therefore situated both in the natural sciences and in the liberal arts and social sciences [1].

Regarding on the field of geography study, it will be studied using methods from both the natural sciences (e.g. field and laboratory analyses), and from the social sciences, as well as history (e.g. survey and interview techniques, observation or source analysis). Therefore, there is variety techniques used in the geography study. These included geographical information systems (GIS), remote sensing (satellite and aerial image analysis), laboratory methods, map interpretation, interview techniques and statistical analyses, and archival research or text and media analyses. The study of geography requires students who could be able to learn in multiple contexts (e.g. transferring some contents to other contexts, identifying different problem statements and scale levels), in multiple perspectives (e.g. learning subjects in different perspectives), and in subject content and solution strategies in multicultural teams [1]. To study geography, teaching and learning should be provided through creative problem solving.
Climate change geography is one of geography study that requires teaching and learning regarding on creative problem solving because the climate change is the most important environmental challenges facing humankind. Geography, therefore, have to contribute to understanding the complex spatial dimensions of climate change, including the observed and anticipated geographical differentiation in potential impacts and vulnerability. Students need creative problem solving to improve their understanding of climate change in geography perspective [2].

2. Framework of creative problem solving

Creative problem solving (CPS) is a structuring strategy for creatively solving real problems [3]. The CPS process will provide a flexible way for problem solvers. In the process, it requires learners to solve problems with creativity and critical thinking. Students’ critical thinking skills support students to analyze and compare obtained knowledge, and revise knowledge from various perspectives [4]. The CPS framework was initially proposed by Alex Osborn, and has been modified by Isaksen and Treffinger [5] as version 6.1. The CPS version 6.1 included four elements including understanding the challenge, generating ideas, preparing for action and planning your approach. Regarding on four elements, teaching and learning approach should be provided through 8 stages. These included constructing opportunities, exploring data, framing problems, generating ideas, developing solutions, building acceptance, designing processes and appraising tasks. This process aimed to enhance students to clarify their understanding of problems, generating ideas, and planning for action through creative ways [6].

Meanwhile, Isrokatun [7] also clarified the CPS as the ability to find a diversity of designs or thoughts to search for several possible effective actions in the problem solving process. The CPS is an ability to provide the process of solving problems for finding the various solutions or answers. The aspects of CPS ability could be provided as 6 aspects including 1) objective finding, 2) fact finding, 3) problem finding, 4) idea finding, 5) solution finding, and 6) acceptance finding. Objective finding is a determination to classify information related to a situation, and challenges and objectives to be resolved. Fact finding is a determination to identify significant information that is less noticeable, and discover data that is still associated to the situation. Problem finding is a determination to examine the statement of the problem, and then select which statement of the problem needs to be resolved. Idea finding is a determination to mention various ideas, and classify possible solutions to solve the problems that have been selected previously. Solution finding is a determination to select the best solution from the list of possible solutions. Acceptance finding is a determination to develop the carrying ability of the solutions that have been selected either with different steps, methods, or answers [8].

3. Developing instructional framework for the CPS climate change geography learning activity via social media

The creative problem solving should be provided from primary education onwards. It could support students to easily connect to the problems in daily life. The CPS foster primary school students to develop their divergent thinking, attitudes towards creativity, active learning and exploration [9], [10], [11].

To provide instruction for climate change geography, students need develop concepts through creative problem solving. The CPS process would predict, positively associated with idea finding and whether primary school students are able to apply solution finding by identifying their most creative ideas. The climate change from geography perspective related to not only scientific knowledge but also climate change in perspectives of culture and economy, resource management and sustainability, urban development and business development, or political ecology and vulnerability. The social media may engage students’ creative problem solving to identify and anticipate climate change geographical differentiation in potential impacts and vulnerability [1], [2], [11], [14], [15].

Regarding on the literatures about CPS [6], [8], [12], [13] the instructional framework of climate change geography will provide the CPS tasks for primary school students that next to idea finding explicitly embedded and scaffolded fact finding, problem finding, idea finding, solution finding, and acceptance finding. The CPS climate change geography via social media, therefore, will be provided
regarding on the five steps framework. This included 1) fact finding, 2) problem finding, 3) idea finding, 4) solution finding, and 5) acceptance finding.

Step 1: Fact finding is a process of understanding, recognizing and solving problems from a situation, surveying information about problems, identifying real problems, and setting goals to solve problem.

1.1 Recognizing problems, learners study the situation that is a problem by discussing, watching a picture or watching a video. The situation used should be the situation that learners are interested, modern and close to them. Those situations have to be appropriate for the age of the learners as well.

1.2 Understanding the occurring problems, the learners need to study and understand the given situation in order to gather the cause information and specify the answer as much as possible. Questions that begin with who, what, when, where, why and how may be used to ask.

1.3 Gathering data to identify problems, students need to consider whether the data is enough. In case that the information is not enough, they must search for additionally relevant information as preliminary information to identify the problem in the next step.

Step 2: Problem finding is a process to compare all the causes of the problem and then organize priority to choose the most important cause as a point for finding solutions.

2.1 Analyzing problems, the learners must analyze the information obtained from the situation about what problems needs to be solved.

2.2 Prioritizing and considering the urgent problem, when students gather the issues from the situation, each problem may have different priorities and effects. Therefore, students must prioritize the problems and select the most important problem that need to be resolved urgently. Students have to specify the reason why their chosen situation is important and necessary for being resolved as quickly as possible. They may select the same or different problems depending on the experience, basic knowledge, attitude of the learners, so they should be given an opportunity to think freely.

2.3 Assuming the cause of the problems, after the students choose the problems, they must analyze the causes of the problems. Each problem may have many causes, so they are required to gather causes as much as they can.

Step 3: Idea finding is a process of brainstorming to find solutions to problems as much as possible without any judgement if it is proper or not.

3.1. Presenting and Gathering different and new solutions, the learners are required to collect the information of the causes of the problems as basic information in order to find ways to solve the problems. In every cause of the problem, more than a method may be used, and solutions to the problems collected by the students can be either practically possible or impossible. Hence, the teacher should allow the students to express their ideas fully.

Step 4: Solution finding is a process of selecting the most appropriate method from all methods that can be thought. It can be selected by ability and limitation of the person, including the context, conditions, resources, and obstacles as the criteria for consideration.

4.1 Identifying the advantages and limitations of each method, the learners must identify the advantages and limitations, the possible effects of each solution as much as they can.

4.2 Analyzing, assessing, and prioritizing problem-solving methods. Students need to analyze readiness, cognitive sequencing, solving-problem-method sequencing

4.3 Setting the criteria for selecting the problem-solving method when the learners are aware of the advantages and limitations of each method and prioritize steps of solving-problem methods, the learners have to determine the criteria for selecting the suitable solution in each context.

4.4 Selecting the most suitable solution, learners choose the only one most suitable solution according to the criteria specified by the learners. They must be able to explain why they choose a solution to the problem, what the steps to solve the problem are and the advantages, limitations, and the effects of the solution.

Step 5: Acceptance finding is a process of practical implementation of the plan. It is to prove that the chosen methods are actually applicable.

The chosen method has been applied in real life situations and can solve problems when the learners have the solutions. The students solve the problem according to the chosen method, including
the report to the instructor and the classmates to know the result of the solution including the effect of the solution, and the steps in problem solving for further evaluation.

Learning management through creative problem solving is learning management starting from the consideration of problematic situation in order to motivate students’ learning by conducting individual learning activities, group process and collaborative process by practicing students to understand problems, practicing looking at problems using both feelings and focusing on solving problems in order to do it more efficiently. The effective solution should be thinking to solve the problem or inventing the answers and the methods that are new, different, suitable for the problems in each context, valuable and useful from the creative problem-solving process, which can be applied to the teaching and learning. It has details and guidelines for teaching and learning as follows.

According to the 5 steps CPS framework, the instruction begins from considering the situation that causes the problem. Then, it move to stimulating students’ leaning by doing individual activity, group work, collaborating with other. Students will understand about the problem and try to look through problem by using both feeling and oriented solution. And, provide activities for making the operation more efficient solutions. An effective solving problem should look into idea aimed solving problems or inventing answer different way of the past. From the procedures of creative problem-solving shows details about instructional activities, as the table 1.

Table 1: the example of instructional activities by using Creative Problem-Solving via Social Media

| Steps       | Sub-step | Activities                                                                 | Tools                      |
|-------------|----------|-----------------------------------------------------------------------------|----------------------------|
| Step 1: Fact finding | 1.1 Knowing the problem | Presenting problems through social media about “causes and effects of climate change” and “what people learn about the impact and consequences of climate change and global warming for the environment and our lives”. | YouTube                    |
|             | 1.2 Understanding the problem | Students clarifying with the problems and concluding thought by using social media at the prescribed time. | Group Investigation, YouTube |
|             | 1.3 Collecting the details to analyse problem | Students searching and collecting data for finding the solution as much as they can. | Group Investigation, YouTube |
| Step 2: Problem finding | 2.1 Considering the point of problem | Students searching and conducting details for using in the next step of dealing with the problem | Group Investigation, flashcards |
|             | 2.2 Prioritizing the problem and choosing the most important problem to find the solution and specify the reason | Students contemplating cause of problem from social media | Group Investigation, YouTube |
Table 1 (Cont’)

| Steps | Sub-step | Activities | Tools |
|-------|----------|------------|-------|
| 2.3   | Assuming the cause of problem | Students understanding and regarding cause of problem from social media | Group Investigation, YouTube |
| Step 3: Idea finding | 3.1 Presenting and collecting ways of dealing with problem variously | Students presenting the solution of solving problem in the group. They will share and create the solution with peers. Also expressing the problem with solutions. | Role play |
| Step 4 : Solution finding | 4.1 Telling the advantages and disadvantages of each solution with determining criteria for selection of solution | Students analyse pros and cons of solving problem. They will talk about the impact of processing of solving problem. | Group Investigation, Role play |
|     | 4.2 Weighting ways of solving problem | Students diagnosing ways of saving problem from role play | Group Investigation |
|     | 4.3 Making criterion of choosing way of solving problem | Students making criteria solutions suitably and appropriately | Group Investigation, |
|     | 4.4 Selecting suitable solutions | Students considering of choosing the way of solving problem suitably | Group Investigation |
| Step 5: Acceptance finding | 5.1 Detailing instructions of solving problem and altering with real life | Students analysing the way of solving problems thoroughly. Also applying with real situation. | Group Investigation, Plickers |

4. Conclusion
According to learning activities with creative problem solving via social media, the students probably could be able to form various thoughts of solving problems without getting attach to old methods. The CPS framework would structure students’ ideas of solving problems creatively. Problems and purposes will be the stimulation of students’ learning with creative and using critical skills. Students will be doing the activity individually and as group to be share thought with other. Moreover, they can consider and make decision to choose the best suitable ways of solving problems under restrictions.

The CPS would provide strength point of learning about climate change geography. It is developing students’ thought more than focusing on the contents. It helps students think and do bravely. They will be confident and share with other. And, the CPS would promote students’ thought
by collecting data, classifying, ordering, and assessing. The CPS will also provide teacher role to facilitate students and set the environment for students learning. Teachers could take care of students and observing the participation of students. However, teachers need to encourage classroom to do activity and foster students to summarizing their thoughts in each step.

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