The Creation of Perception and Collaboration in Decreasing The Effects of Climate Change through Stem Education

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Abstract. The aim of this research was to study environmental catastrophes caused by climate change in northern Thailand, which have had a direct impact on people’s health, their quality of life, and the economy. It was found that the smog caused by forest fires, open-air burning, and smog emissions from vehicles has been the problems in northern Thailand. Furthermore, the level of particulate matter smaller than 10 microns (PM10) could rise to 383 micrograms per cubic meter of air in some years. This level exceeded by three times the air quality standards of Thailand with a 24-hour average level of 120 micrograms per cubic meter of air. Therefore, the purpose of this research was to study and develop the instruments, methods, and implementations in reducing the effects of climate change by constructing perception and collaboration in decreasing the effects of climate change through STEM Education with undergraduate students. The participants of this study were 67 students majoring in Industrial and Technological Education at Chiang Mai Rajabhat University who had the pre-service student teaching practicum experience in the academic year 2018. The participants of this study could be role models for knowledge management and publicize the knowledge of reducing catastrophic effects of smog among primary and secondary school students, school staff and communities and give aid when an emergency occurred. There were 40 schools in northern Thailand participating in this research project. With reference to the research findings, they revealed that before participating in this research project, the 67 students had knowledge of catastrophes caused by climate change in northern Thailand at a level of 45 percent on average, while their knowledge increased to 88 percent after taking part in this project. In other words, their knowledge increased by 43 percent or there was a significant increase in knowledge to 95 percent. It can be concluded that the students in this study could create a role model of knowledge management, distribute information on how to decrease catastrophe from the smog, and give help efficiently to the 40 schools participating in this research project when there was an emergency (without significant difference).

1. Introduction
At present, catastrophes caused by the climate change in northern Thailand has had an impact on people’s health, quality of life and the economy. It was found that the smog problem occurring in northern Thailand was caused by forest fires, open-air burning and the emissions from vehicles [1]. The amount of particulate dust with a diameter of 10 microns (PM10) rose to 383 micrograms per cubic meter of air in some years, which is three times higher than the defined standard of climate quality in Thailand, which is a 24-hour average level of 120 micrograms per cubic meter of air [2]. To understand each theory through practical learning to experience as well as to improve thinking skills, asking questions, solving problems and analyzing new information in order to use those methods to integrate
with daily life efficiently is essential in educating and developing instruments, means and operating plans. Decreasing the impact of climate change by creating the perception and participation in decreasing its impact through STEM EDUCATION by interdisciplinary integration among the fields of Science, Technology, Engineering, and Mathematics can solve the problem by taking the advantage of nature including the learning methods of each field perfectly combined in order make the learners apply the knowledge to solve the problems, do research and other various developments in the present world [3]. The students at Bachelor of Education level (Industrial and Technology Education) [4] set up the model of organizational management knowledge, public relations in decreasing the impact of smog and provide assistance in emergencies which can be used practically for primary students, high school students, school personnel and community

Research Objective are: (1) To study and improve the practical instruments, means, and plans to decrease the impact caused by climate among people; (2) To acquire knowledge and build awareness of teachers and students in decreasing the impact of climate change.

2. Materials and Methods
Creating perception and participating in decreasing the impact on the changing climate through STEM EDUCATION consists of the following:

2.1. Research and plan to promote STEM Education
Create perception and participation in decreasing the impact of climate climate through STEM EDUCATION system of 67 Bachelor of Education (Industrial and Technology Education) students at Chiang Mai Rajabhat University who were preparing for teaching internships in 2018 by building the model of organizational management knowledge, public relations in decreasing the impact of smog problem and assisting in emergencies.

2.2. Create and develop the instruments and the methods of STEM Education by:

- Enhancing the method of creating the motivation to change behavior towards decreasing the impact of climate change through STEM Education
- Creating a model for sustainable reforestation, and dealing with soil, forest and water problems through STEM Education
- Creating a supply change model for decreasing the impact of climate change through STEM EDUCATION
- Decreasing the gas intensity in the atmosphere to reduce future changes in world temperature through STEM Education

2.3. Analyze the comparison of the knowledge
Analyze the comparison of the knowledge of 67 students in creating perception and participation of decreasing the impact of climate change through STEM Education that they understood and did not have any health problems caused by climate change and were ready to face the danger which might happen using a 20 point questionnaire.

3. Results and Discussions
The knowledge gained by 67 students participating in the project of creating perception and participation in decreasing the impact of climate change through STEM Education was analyzed and compared seen in Figure 1.
Figure 1. The project of creating perception and participation in decreasing the impact of climate change through STEM Education.

It was found that pre-participation in the project, 45% of the 67 students were aware of the catastrophes caused by the climate change in the north of Thailand, while post-participating in the project of creating the perception and participating in decreasing the impact on the changing climate through STEM Education, awareness of the catastrophes increased to 88% seen in Figure 2.

Figure 2. The pre-participation and post-participation in the STEM Education test results

4. Conclusions
The analysis of the results showed an increase of 43% in student knowledge of the catastrophes caused by climate change, which means student knowledge increased significantly with a reliability of 95%. This indicates that the students set up the model of managing and promoting the organization in order to decrease the smog problem and efficiently supported in an emergency the 40 schools which
participated in the project. Natsarin Buecha studied the results of learning management according to STEM Education toward the effective result of biology, the ability to solve problems, and the satisfaction with learning management of 11th grade students. The research found that students learning through STEM Education had improvement scores of 41.30% at the beginning level, 30.77% at the intermediate level, 20.51% at the advanced level and 7.69% at the high-advanced level. The students improved in studying biology and problem solving before and after the project at a statistical significance of 0.1 [5].

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