Development of Learning Achievement in Geography through Using Geographic Process and Graphic Organizers

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Abstract

This study was a classroom action research, CAR. The research design was used as a research methodology with a Single Group Pretest-Posttest experimental design. The objective of this research was to compare learning achievement in Geography of ninth grade students before and after using geographic process and graphic organizers. The geographic process consisted of five steps; 1) asking geographic question, 2) data collection, 3) data organization, 4) data analysis and interpretation, 5) drawing conclusion to answer the question. In term of the graphic organizers, there were five types; concept map, mind map, diagram, table, and fishbone diagram. The target group was 30 ninth grade students from the Pramochwittayaramintra School that is the school network for the internship of the pre-service teachers, College of Teacher Education, Phranakhon Rajabhat University, Thailand. The experimental instrument consisted of daily lesson plans based on the geographic process and graphic organizers. The duration of the experiment was 10 periods, 1 hour per period and 1 period per week. The data collection instrument was Geography learning achievement test. The data was analyzed by using arithmetic mean ($\bar{x}$), standard deviation (S.D.) and t-test. The result found that the learning achievement in Geography of ninth grade students after using geographic process and graphic organizers was higher than before the experiment with the statistical significance level of .05.

Keywords: Learning Achievement in Geography, Geographic Process, Graphic Organizers

Introduction

Geography is the study of the world and all that is in it: its peoples, its land, air, and water, its plants and animals, and all the connections among its various parts. When you are investigating the world and its events you are dealing with geography. As you move through space in your everyday life you are observing and interacting with geography and making geographic decisions based on those encounters (ESRI Schools and Libraries Program, 2003).

For basic education curriculum of Thailand, Geography is one of the five strands in Social Studies, Religion and Culture Learning Area which is a study of the nature of the physical world the physical characteristics of the earth; the physical characteristics, resources and climate of Thailand and various other regions of the world; the utilization of maps and geographical instruments; the inter-relationship of various things in the natural system; the relationship between man and the natural environment and man-made objects; the presentation of geo-data and information; the preservation of the environment for sustainable development (Ministry of Education, Thailand, 2008). Later, the Basic Education Commission improved the learning standard of geography by requiring the usage of geographic processes to study geographic content in order to improve geography learning as follows (Office of the Basic Education Commission, 2017):

Strand 5: Geography

> Standard SO5.1: Understanding of the physical characteristics of the earth and the inter-relationship of various things which affect one another; the utilization of maps and geographical instruments for searching, analyzing, drawing conclusions based on geographic process and efficient utilization of geo-data and information.
>
> Standard SO5.2: Understanding of the interrelationship between man and the physical environment leading to the way of life's creativity; the awareness of and the participation in resources and environment management for sustainable development.

From testing the learning achievement in the geography of the academic year 1/2018, it found that the ninth grade students of Pramochwittayaramintra School had not achieved the standard and goals of the school. Because the instructor still used the same teaching method that had previously followed the old curriculum, it focuses on emphasizing lectures, discussion, and explanation of examples or problem based on the textbooks to students. It made the students less interested in learning. Their understanding was unclear. Therefore, the researcher tried to studies the ways to develop students to have higher learning achievement by using the geographic process which is an instructional process based on a new curriculum used in conjunction with graphic organizers.

The geographic process can be used as guidelines for managing activities in geography that are consistent with the inquiry method and problem-solving method. It also promotes observation skill, interpretation of geographic data skill, using technology skill, and using basic statistics skill for drawing the conclusions to answer the geographic questions (Office of the Basic Education Commission, 2017). These conclusions are geographic information that is meaningful learning for learners. These factors will affect higher learning achievement in the geography of learners.

Ausubel's theories support learners engagement while learning, specifically the processing of new information to construct meaning for long-term retention (Ausubel, 1963; Marzano, 2007). Graphic organizers became a useful tool for showing information they had read on a map, taking notes from the social studies textbook, and even organizing their oral presentations (Longhi, 2006). Graphic organizers as one of the most popular techniques for learners to represent knowledge they are learning which the researchers expect that can be used to analyze, synthesize and summarize geographic information.

From the above rationale, significance and problem, the researchers were interested in the development of learning achievement in geography of ninth grade students, Pramochwittayaramintra School through using geographic process and graphic organizers.

Research Objective

The objective of this research was to compare learning achievement in Geography of ninth grade students before and after using geographical process and graphic organizers.

Research Question

The research is designed to answer the following questions: How geographical process and graphic organizers affects learning achievement in Geography of ninth grade students?

Conceptual Framework

The conceptual framework of this research was as follows:

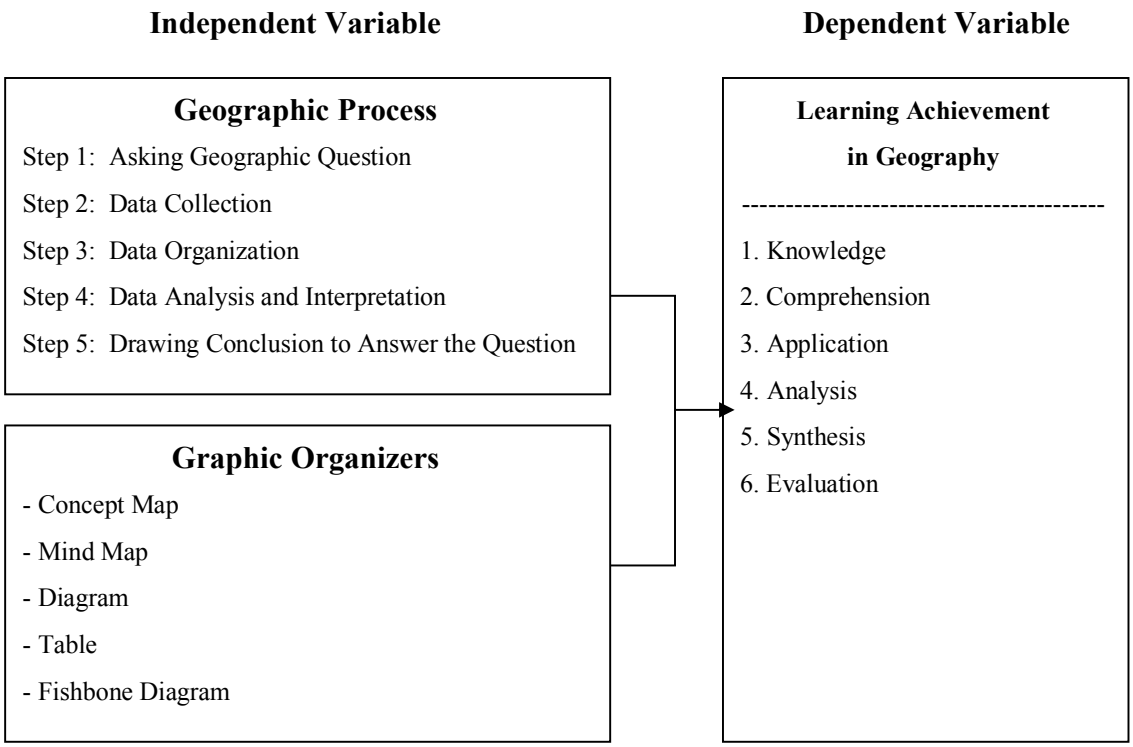

Figure 1. Conceptual Framework

Methodology

The research methodology of this study was experimental research. The experimental design was a Single Group Pretest-Posttest design (Creswell, 2008).

Table 1

Experimental Design

Group	Pretest	Treatment	Posttest
TG	T1	X	T2

TG = Target group

X = Using geographic process and graphic organizers

T1 = Pretest

T2 = Posttest

Target Group

The target group of this research was 30 ninth grade students from the

Pramochwittayaramintra School that is the school network for the internship of the pre-service teachers, College of Teacher Education, Phranakhon Rajabhat University, Thailand.

Variables

The variables of the research were as follows:

1. Independent Variables: geographic process and graphic organizers
2. Dependent Variable: learning achievement in Geography

Time

The duration of the research was October - December 2018.

Research Instruments

There were two types of research instruments;

1. Data collection instrument: Geography learning achievement test
2. Experimental instruments: daily lesson plans based on the geographic process and graphic organizers

Experiments and Data Collection

1. Determined the target group.
2. Asked ninth grade students to do the Geography learning achievement test (Pretest: 30 items).
3. Used geographical process and graphic organizers.
4. When all the lessons were learned, asked ninth grade students to do Geography learning achievement test (Posttest: 30 items) with the same test as the pretest.
5. Collected and analyzed the data from research instruments.

Data Analysis

The researchers collected the data from each research instrument to do statistical analysis. The data was analysed by using descriptive statistics; arithmetic mean ($\bar{x}$), standard deviation (S.D.) and t-test. The researchers compared the learning achievement in Geography of ninth grade students between the pretest and posttest with the t-test statistic at the significance level of .05 (Dependent t-test).

Literature Review

Research on *Development of Learning Achievement in Geography through Using Geographic Process and Graphic Organizers*, The researchers presented the literature review of this study into three parts: learning achievement in Geography, geographic

process, and graphic organizers.

Learning Achievement in Geography

Familiarly known as Bloom's taxonomy, a framework for categorizing educational goals was first published in 1956 by Benjamin Bloom. It's objective of the hierarchical cognitive learning based on Bloom and Krathwohl (1956) who developed and constructed a group of brain-related behaviors. In the original version of the taxonomy, the cognitive domain can be classified as six levels of objectives; knowledge, comprehension, application, analysis, synthesis, and evaluation. This original version still used widely in educational research of Thailand and quite suitable for the multiple choices test (data collection instrument).

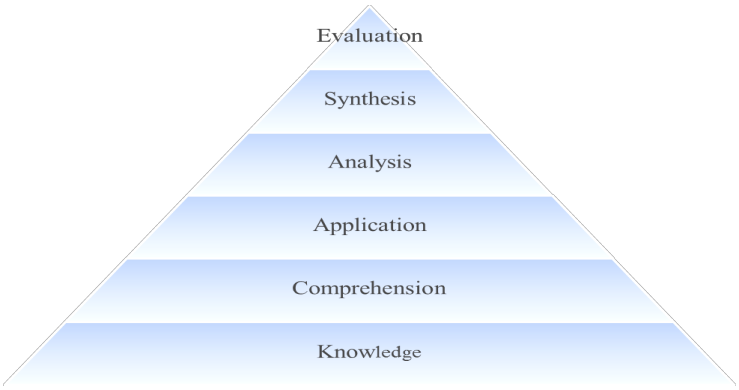

Figure 2. The Original Taxonomy by Bloom and Krathwohl (1956)

One of the importance's learning achievement measurements is creating the test questions associated with learning objectives. In Geography, the instructor must determine learning objectives in all six levels of the cognitive domain as the example of table 2.

Table 2

Examples of Writing Test Questions Associated with Learning Objectives

Hierarchy of Cognitive Domain	Examples of Writing Test Questions
1. Knowledge	Learning Objective**:** Tell the locations and boundaries of Asia. Question: Where is Asia located? : Where are the Asian borders?
2. Comprehension	Learning Objective: Explain the environmental changes in Europe and the results of such changes.

Hierarchy of Cognitive Domain	Examples of Writing Test Questions
	Questions: How has the European environment changed? : How does environmental change in Europe affect humans?
3. Application	Learning Objective: Use geographical instruments to collect, analyze and present the physical and social characteristics of North America. Questions: From the physical map of North America, how can you present the geographic characteristics of the continent? : If students want to study the resources and culture of North America, what geographic instruments will students choose?
4. Analysis	Learning Objective: Analyze the relationships between the physical and social characteristics of South America. Questions: How do the physical characteristics of South America affect the lives of South Americans? : What factors influence the social characteristics of South America?
5. Synthesis	Learning Objective: Create the guidelines for conservation of the natural resources and the environment in Africa. Questions: How will students propose ways to conserve natural resources and the environment in Africa? : From environmental problems that occur in Africa, how will students propose environmental management guidelines?
6. Evaluation	Learning Objective: criticize the situations and the crisis relating to the natural resources and the environment of Thailand and of the world. Questions: Do students agree with the saying Thailand's environmental situation is not at a critical level. Why? : "Thailand always participates in the management of the world's environmental problems." Do students agree with this statement? Why?

Geographic Process

The geographic process is a learning activities management in Geography for

learners to develop learning achievement and various skills that developed by Committee of Curriculum and Instruction Development in Geography. Instructors may use problem-solving methods or inquiry methods to motivate learners through the geographical process that consisted of five steps (Office of the Basic Education Commission, 2017: 5) as follows:

1. **Asking geographic question** is the step that the identifying various issues which the learner use for considering and finding the answers to achieve the educational objectives. It must be in the form of sentences, questions that are concise, clear, and relevant such as "What factors have influenced the change in the characteristic of rivers?
2. **Data collection** is an important step in the geographic process that gathers useful facts, data, and information. It also includes information that expected to use for educational purposes. Data collection needs to require knowledge and techniques such as data types, data log design, data validation, data enumeration, questionnaire design, and recording observations, etc.
3. **Data organization** is the step of organizing information from data collection for educational purposes. It is also to check the completeness and accuracy for ease of data analysis.
4. **Data analysis and interpretation** are the heart of the geographic process. When the data was organized, it will be easier to explain, analyze and translate the data with basic statistics.
5. **Drawing conclusion to answer the question** is a summary of the content to answer the geographic question in step 1. In addition, learners must criticize the results to answer educational objectives. The learner must report the results in each process thoroughly, accurately and clearly according to the method of data analysis that may have to reference the conceptual framework and various theories.

Graphic Organizers

In the early 1960's, the literature supported graphic organizer use when Ausubel (1963) theorized that the manner in which new concepts are represented could influence student learning. Ausubel shared that the brain arranges and stores information in an orderly fashion around existing schema. A learner's schema already contains existing knowledge about a concept. Therefore, graphic organizers help learners arrange new information in a visual manner that complements this schematic framework, making information easier to understand and learn. Ausubel's theories support learners engagement while learning, specifically the processing of new

information to construct meaning for long-term retention (Marzano, 2007).

Graphic organizers are the visual representation of knowledge that structures information by arranging important aspects of a concept or topic into a pattern using labels (Bromley, DeVitis & Modlo, 1999). Graphic organizers became a useful tool for showing information they had read on a map, taking notes from the social studies textbook and even organizing their oral presentations (Longhi, 2006). Graphic organizers reduce the cognitive demand on students by helping them access information quickly and clearly. Using graphic organizers, learners can understand content more clearly and can take clear, concise notes. Ultimately, learners find it easier to retain and apply what they've earned (Cleveland, 2005).

For this research, the researchers have chosen to use graphic organizers that are appropriate for the content in Geography. These graphic organizers consisted of five types as follows:

1. **Concept Map.** A concept map is a type of graphic organizer used to help students organize and represent knowledge of a subject. Concept maps begin with a main idea (or concept) and then branch out to show how that main idea can be broken down into specific topics (The Leader in Visual Thinking and Learning, 2019).
2. **Mind Map.** A mind map is a visual representation of hierarchical information that includes a central idea surrounded by connected branches of associated topics (The Leader in Visual Thinking and Learning, 2019).
3. **Diagram.** A diagram is a symbolic representation of information according to some visualization technique. Diagram is chart or graph can help by summarizing the key features of the data, and representing it as a picture (Thorpe, 2018).
4. **Table.** A table is used to organize or categorize information or to make comparisons among categories. It is used to compare two items. If we use to compare multiple items, we will call it that Matrix (Alvin C. York Institute, 2018).
5. **Fishbone Diagram.** A fishbone diagram, also called a cause and effect diagram or Ishikawa diagram, is a visualization tool for categorizing the potential causes of a problem in order to identify its root causes (Ishikawa, 1968).

Results

The results of using geographic process and graphic organizers were presented in quantitative data. The results were shown as follows:

Table 3

A Comparison of Ninth Grade Students' Learning Achievement in Geography before and after Using Geographic Process and Graphic Organizers

Target Group	N	$\bar{x}$	S.D.	t-test	Sig
Pretest	30	9.50	2.33	22.984	0.000
Posttest	30	17.03	1.73		

*p < .05

From Table 3, the mean scores of ninth grade students' learning achievement in Geography before the experiment was 9.50 (S.D. =2.33), and after the experiment was 17.03 (S.D. =1.73). It found that the learning achievement in Geography of ninth grade students after using geographic process and graphic organizers was higher than before the experiment with the statistical significance level of .05.

When considered from the observation of learning activities in class were shown as follows:

1. Learning in the asking geographic question step helped students to observe various types of images, data, and maps. They made the question reflect the goals of geography learning in class. These behaviors promoted students to engaged about finding own answers.
2. Learning in the data collection step helped students knew how to search the data. While collecting data, students will read the content each data and select useful data for the study. These behaviors promoted students to consider the credibility of sources. Students earned knowledge and understanding of topics that search by using geographic tools and technologies.
3. Learning in the data organization step, students were able to use the cognitive process to organize data into various forms of graphic organizers. Students earned developing linking the relationship of data and systematic thinking.
4. Learning in data analysis and interpretation step helped students to analyze physical and social characteristics including translate data from maps and geographic tools to be easy to study.
5. Learning in drawing conclusion to answer the question step helped students synthesize the information and then answer the geographic questions that they suspect in the first step (asking geographic question).

From observing the behavior of students showed that the geographic process helps to develop students' learning achievement in each component such as knowledge, comprehension, application, analysis, synthesis, and evaluation.

Discussion

After the announcement of the Geography Curriculum (Indicators and Core Learning Contents of the Geography Strand, Revised Edition 2017), the researchers were the first team in Thailand that conducted the experiment using the geographic process based on guidelines of the Basic Education Commission. However, there were still previous studies of educators who conducted research on the composition of the geographic process, namely inquiry-based learning including technique used in learning social studies or geography was graphic organizers.

The result of this research was the learning achievement in Geography of ninth grade students after using geographic process and graphic organizers was higher than before the experiment with the statistical significance level of .05. The findings of the research showed that geographic process and graphic organizers were able to develop knowledge and cognitive skill such as analysis, synthesis, and evaluation of learners.

All of the above have shown support in the answers of the research question. The results were based on the hypotheses given and consistent with the results of the research of Ritthikraivorakul (2017) who studied the development of learning achievement and group work abilities on the Geography of Europe and Africa of Mathayomsuksa 2 students (eighth grade students) using inquiry based learning and graphic organizer technique, the research results revealed that: 1. The learning achievement of the students on the geography of Europe and Africa gained after the participation in the learning management using inquiry based learning and graphic organizer technique was higher than the learning achievement gained before the participation learning at the level of .05 significance, 2. The group work abilities of students improved after their participation during the learning management using inquiry based learning and graphic organizer technique was increase, 3. The graphic organizer of students improved after their participation during the learning management using inquiry based learning and graphic organizer technique was higher than 70 % In addition, the research results consistent with the results of the research of Preston, Harvie, and Wallace (2015) who studied the inquiry-based learning in Teacher Education. The research results revealed that preliminary findings of surveys of pre-service teachers conducted pre and post the implementation of the inquiry model suggest increased engagement and enhanced learning outcomes. These results found that inquiry-based learning is a part of the geographic process which effect on higher learning achievement and increased engagement. Moreover, the research results consistent with the results of the research of Rungruang (2013) who studied the effects of learning process by using graphic organizers on achievement of Social

Studies, Religion and Culture. The research results found that achievement in Social Studies, Religion and Culture after learning process by using graphic organizers was gained higher significantly than before learning process by using graphic organizers at the level of .01. These research results were consistent with Marzano's conceptual framework "graphic organizers help learners arrange new information in a visual manner that complements this schematic framework, making information easier to understand and learn" (Marzano, 2007). Moreover, Ausubel's theories support learners engagement while learning, specifically the processing of new information to construct meaning for long-term retention (Ausubel, 1963).

For the application of this process and technique, the researchers assigned the pre-service social studies teachers to try out the geographic process that taught to them to their both primary and secondary level students. In Thailand, the pre-service social studies teachers must go out and do their teaching experiences for approximately 1 year which we called "Internship." When they come back to the seminar in the middle of the semester, they reported back to the researchers that not only their students' achievement was higher in social studies achievement after participated in the process, but the students also earned the geographic skills.

Recommendations

For this research, the researchers presented useful recommendations to instructors and other researchers as follows:

Recommendations for Research Implementations

1. Instructors have to be well prepared to give many examples of geographic question examples; this is to encourage students that geographic question is not that hard beyond their abilities to setting for asking geographic questions.
2. Instructors have to be well prepared interesting examples of graphic organizers for the learning of students both learning content from graphics organizers and creating knowledge as graphic organizers.

Recommendations for Further Research

1. Researchers should study the effects of geographic process and graphic organizers on geographic skills such as observation, interpretation of data, using geographic technique and equipment, etc.
2. Researchers should study the students' satisfaction in learning management with the geographic process in the next time to improve elements or steps of this process effectively.

Conclusion

This research is collaboration between the social studies program, the College of Education Teachers, Phranakhon Rajabhat University and Social Studies, Religion and Culture Learning Area of Pramochwittayaramintra School. The research methodology of this study was experimental research. The experimental design was a Single Group Pretest-Posttest design. The research result found that the learning achievement in Geography of ninth grade students after using geographic process and graphic organizers was higher than before the experiment with the statistical significance level of .05.

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