Concept Mapping to Learn and Innovate
Proc. of Sixth Int. Conference on Concept Mapping
Santos, Brazil, 2014

# THE APPLICATION RESEARCH OF CONCEPT MAP IN ANALYTICAL TASKS OF PUPILS' EXPOSITION READING

*Huiling Chen & Guoqing Zhao, Beijing Normal University, China*
*Shulan Chen & Haihui Yang, Beijing Hongying Primary School, China*
*Email: Guoqingzh@163.com*

**Abstract:** A quasi-experiment was conducted in this study. 101 sixth grade students from a primary school in Beijing participated in the experiment. They were divided into three groups including concept map revision group, concept map filling group and no concept map group. The experiment had four stages like pretest, preparation, reading training and posttest and lasted about seven weeks. Students from different groups studied exposition readings with different strategies. And then test them to explore the effects of concept map strategies in reading tasks. Experimental results are as follows. Using concept maps can make analytical tasks easy basically. Grades of students in concept map revision group and filling group are more than those of students in no concept map group significantly. Concept map strategies have different effects in different analytical tasks. In programs of classification, deduction, error analysis and induction, students in concept map groups did much better than those who didn't use concept maps. While in programs of summary, indicating description methods and statement functions, concept maps have no much superiority. Concept map revision strategy and concept map filling strategy have different effects on learning results. Significant difference may appear after a long time.
**Keywords:** concept map, analytical task, exposition reading, pupil

## 1 Introduction

A survey of Grade Six students' feedback on Chinese learning was conducted. In this survey, students were required to choose types of questions that they feel most difficult and most unwilling to do, among seven types of questions (A. writing Chinese characters according to Pinyin , B. filling in the blanks, C. choosing words and filling in the blanks, D. writing sentences according to certain requirement, E. revising sentences with grammar mistakes, F. reading and comprehension, G. writing an issue).

Among all 63 students in this survey, 81.0% of them chose F. reading and comprehension, and 74.6% of them chose G. writing an issue. Thus, it is obvious to see that F. reading and comprehension and G. writing an issue are types of questions that students feel most difficult and most unwilling to do. What caused this is the lack of higher order thinking skills. To change students' learning attitude and improve academic performances, we need to teach students learning methods and ways of thinking. Cognitive tool is a kind of tool that support, guide and expand learners' thinking process. It enables learners to process information, construct meaning and improve thinking ability effectively. Concept map is really such a kind of cognitive tool that visualize knowledge, realize meaningful learning and reduce cognitive loads.

Accordingly, this study aims to explore effects of concept map in different analytic tasks in exposition reading programs in Chinese subject.

## 2 Methodology

### *2.1 Participants*

101 sixth grade students from a primary school in Haidian district of Beijing participated in the experiment. They were divided into three groups according to natural classes. Experimental group 1 is the concept map revision group with 33 students from the first class, while experimental group 2 is the concept map filling group with 35 students from the second class. Other class three students belong to the control group without concept maps.

### *2.2 Tools*

(1) Introductory material: The introduction and application of concept map is made to introduce concept map to members of experimental group. The material tells students what's concept map and concept

map's forms and drawing methods. Examples are listed to introduce concept filling, revision and drawing tasks.

(2) Reading material

Seven extracurricular composition readings of sixth grade levels are selected and revised by researchers to meet students' reading habits and levels.

(3) Reading tests

Analytic tasks of exposition reading are defined as the following seven types, namely, classification, error analysis, induction, summarizing, deduction, description methods and statement functions. Questions are designed according to the contents and core ideas of articles. Choices, filling in the blanks, true or false and short answer questions are included. Different questions with different testing points and difficulties are varying in score weights. One point per question like choices and true or false or per answer point of subjective items.

(4)Evaluation criteria

Objective items (choices, true or false): one point is given for correct answer, while zero point for no answer or wrong answer.

Subjective items: Grade according to the given points. One score per point.

A pretest was taken to assure the testing quality.

### *2.3 Experimental hypothesis*

(1) There are significant differences between grades of students in concept map revision group and filling group and those of students in no concept map group.

(2) Grades in different types of analytical tasks are quite different between concept map filling and revision groups and no concept map groups.

(3) There are differences between grades of students in concept map filling group and concept map revision group in analytical reading tasks.

### *2.4 Experimental Process*

This experiment will be taken in sixth grade's one optional course on Wednesday and last seven weeks. Miss Yang is a Chinese teacher and also teaches this optional course. Contacting with the Teachers and Informing them of the Arrangement.

(1) Communication with teachers

Before experiment, the author will communicate with Miss Yang and inform her the experiment aims and arrangements to get her support and cooperation. Since reading materials are related to Chinese course, we tell Miss Yang the specific experimental design and ask her to examine and revise reading articles and testing questions together with the author to ensure the reliability and validity. In the whole procedure of experiment, Miss Yang just participated in the design of experimental tools with the author. Other procedures are conducted by the author independently without any intervention in students' learning activities.

(2) The Pre-Test

Three groups of students will be required to read two essays within 60 minutes, each of which is 15 points in total.

(3) The Research Procedures

The learning process of experimental groups includes the following three phases:

a) *A general knowledge of CM*：Give out the reading material The Concept Map and the Introduction to Its Applications to students of experimental groups. Students learn it autonomously for 40 minutes to have a preliminary understanding of concept map.

b) *A preliminary learning of concept map*: Give students of experimental group 1 a wrong concept map about triangles and ask them to correct it. Give students of experimental group 2 a concept map with blanks about triangles and ask them to fill them up. By this, students of two experimental groups will know the concept map strategies used in experiment later. This procedure will also last 40 minutes.

c) *Practice of concept map strategies*: Before practice, students from experimental groups will get a reading material, a concept map revision or filling task material and a comprehension test material. In the first stage of practice, students are asked to complete concept map tasks. Next, they are given comprehension exercises. Students of experimental groups will have three rounds of practices with different reading materials. While students of control group just need to have three times of comprehension practices. During every practice, they will be given a reading material and relevant comprehension exercises. When students of control group have practices, the methods and strategies they used will be not concerned.

By the way, requirements about experiments are indicated in instructions. Teachers and researchers will not intervene in students' study.

(4) The Post-Test

Students of experimental group will do concept map revision or filling tasks and comprehension tests according to two reading materials. While students of control group just need to have the comprehension tests.

## 3 Experiment Result

SPSS16.0 was used to analyze the data of pre-test and post-data.

### *3.1 The analysis of pretest reading scores based on different learning strategies of concept map*

In order to detect whether the pretest reading scores are homogeneous between two experimental groups and control groups, for whom measurements were carried out before experiment. Test scores of descriptive statistics and ANOVA results revealed that there's no significant difference between the scores of experimental groups and that of control group. So, before experiment, students' comprehension levels are almost homogeneous in seven types of questions. It's reasonable to divide students into three groups according to classes.

### *3.2 The analysis of post-test scores in different types of analytical tasks*

**Table 1:** Post-test scores of three groups in different items

| **Items** | Experimental Group 1 | Experimental Group 2 | Control Group | **p** |
|---|---|---|---|---|
| | **Mean (SD)** | **Mean (SD)** | **Mean (SD)** | |
| Total scores | 12.20（1.495） | 11.97（1.752） | 10.17（1.744） | 0.000* |
| description methods | 0.50（0.509） | 0.30（0.466） | 0.53（0.507） | 0.148 |
| classification | 2.97（0.183） | 2.97（0.183） | 2.33（0.844） | 0.000* |
| deduction | 1.97（0.183） | 1.90（0.305） | 1.60（0.621） | 0.002* |
| error analysis | 2.83（0.379） | 2.80（0.407） | 2.53（0.629） | 0.036* |
| summarizing | 0.87（0.776） | 0.80（0.551） | 0.57（0.504） | 0.152 |
| statement functions | 0.03（0.183） | 0.00（0.000） | 0.07（0.254） | 0.364 |
| induction | 3.03（1.189） | 3.27（1.015） | 2.50（1.408） | 0.048* |

Post-test scores show that concept map strategies have different effects in different analytical tasks. In programs of classification, deduction, error analysis and induction, students in concept map groups did much better than those who didn't use concept maps. While in programs of summary, indicating description methods and statement functions, concept maps have no much superiority.

## 4 Conclusion and Argumentation

### *4.1 Conclusion*

(1) Using concept maps can make analytical tasks easy basically. Grades of students in concept map revision group and filling group are more than those of students in no concept map group significantly.

(2) Concept map strategies have different effects in different analytical tasks. In programs of classification, deduction, error analysis and induction, students in concept map groups did much better than those who didn't use concept maps. While in programs of summary, indicating description methods and statement functions, concept maps have no much superiority.

(3) Concept map revision strategy and concept map filling strategy have different effects on learning results. Significant difference may appear after a long time.

### *4.2 Argumentation*

To understand the results of the experiment deeply and instruct later research, three questions need to be explained.

(1) In programs of classification, deduction, error analysis and induction, students in concept map groups did much better than those who didn't use concept maps.
Possible reasons are that programs of classification, error analysis and conclusion emphasize concept points that appear in the article. Concept maps can also represent these important concept points and make these programs easier. Deduction needs to make new applications and indications according to theories or rules in the article. Specific cases will appear after those theories or rules as explanations and appear in concept maps to afford references for deduction tasks.

(2) In programs of summary, indicating description methods and statement functions, concept maps have no much superiority.
The effects of concept map strategies on indicating description methods are not significant because this program focuses on understanding of description methods and grammar and don't emphasize relationships of concepts. The reason why effects of concept map strategies on summary program is not so good is that students always pay much more attention on details and neglect contents of concept map in a macroscopic view. In that way, they can't summarize the article well.

(3) There's no significant difference between two experimental groups on total mean scores and mean scores of all types of programs. However, mean scores of concept map revision group are more than those of concept map filling group on most of the programs.
When facing uncertain concept maps, students of concept map revision group need to understand the structures and contents of concept maps along with the whole articles and find errors to revise them. Students of concept map filling group get concept maps with correct structures and just need to extract corresponding information and fill in blanks. So, it's more difficult for students to revise concept maps than to fill up concept maps. When they are requested more strictly, their performance in comprehension programs will be better.

## Reference


Kinchin, I. M. Using concept maps to reveal understanding: A two-tier analysis. *School Science Review*. 2000; 81(1):41-46.

Safayeni F, Derbentseva N, Canas A J. A Theoretical Note on Concepts and the Need for Cyclic Concept Maps. *Journal of Research in Science Teaching*. 2005; 42(7):741-766.

Hassan Soleimani. The Effect of Learner Constructed, Fill in the Map Concept Map Technique, and Summarizing Strategy on Iranian Pre-university Students' Reading Comprehension. *English Language Teaching*. 2012.5(9):78-87.

Kevin Oliver. An Investigation of Concept Mapping to Improve the Reading Comprehension of Science Texts. Jouranl of Science and Education Technology.2009.

Schau, Candace; Mattern, Nancy et al. Select-and Fill-in Concept Map Scores as a Measure of Students' Connected Understanding of Science. *Educational and Psychological Measurement*. 61.1 (Feb 2001): 136-158.

Novak J D, Gowin D B. Learning How to Learn [M]. New York: Cambridge University Press, 1984:1-56.

Austin L B, Shore B M. Using concept mapping for assessment in physics[J]. *Physics Education*, 1995(1):41-45.

Safayeni F, Derbentseva N, Canas A J. A Theoretical Note on Concepts and the Need for Cyclic Concept Maps. *Journal of Research in Science Teaching*. 2005; 42(7):741-766.

Abdulkarim, Ra'ed; Raburu, Pamela. Determining the Attitude of Undergraduate Students towards Physics through ConceptMapping. *Journal of Educational and Social Research* 4.3 (Sep 2013): 331-337.

Sowa, J. F.: Conceptual Structures: Information Processing in Mind an Machine. Addison-Wesley.1984.

Taibi D, Gentile M, Seta L. A Semantic Search Engine for Learning Resources[C]. In: *Recent Research Developments in Learning Technologies ICTE*. Badajoz for matex,2005.