

A STUDY ON STUDENTS' LEARNING ACHIEVEMENT WITH CONCEPT MAP IN SENIOR HIGH SCHOOL ECOLOGY COURSE IN TAIWAN

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Abstract. Finding relevant information on the Internet can be a daunting task which would be enhanced if the material were organized and could be accessed in an efficient manner. Browsers based on a concept map-based interface and on a World Wide Web page-based interface were compared for ease in finding information necessary to answer a series of search questions based on the same domain material (developmental psychology). Users differed in the amount of concept map training they received and the type of learner they tended to be (meaningful vs. rote learners). The results indicated that the concept map-based interface resulted in better search performance for all learners although this difference was most pronounced for meaningful learners. Training in concept map construction appeared to have no more effect on search performance using the concept map-based interface, than control conditions. Taken together, the results suggest that organizing information via a concept map-based interface leads to more accurate search performance than the typically used web page-based browser.

1 Introduction

This research is to study the effect of Concept Mapping in the course of Fundamental Biology for senior high schools. Based on the content of Ecology in this course for senior high school, a study was conducted in the school that the researcher teaches, adopting Concept Map teaching methods and traditional teaching methods separately. Students from different interest-oriented groups were studied to examine the difference in learning showed by these students.

Briscoe (1991) indicated that students are usually of the opinion that to memorize contents in the text book is enough and it does not make much sense creating concept mapping. Other students comment that to use concept mapping in learning is difficult. Many students even think that they do not have sufficient knowledge framework to create concept mapping and tend to give up when the slightest frustration is encountered.

It is because positive results and results of no significant difference have both been reported in the application of Concept Mapping in teaching and learning, the researcher feels interested and would like to probe into this topic to see whether different teaching strategy may influence the learning of students, and whether there will be difference among students of different interest-oriented groups.

1.1 Objectives of this study include the following:

1. To probe into effects on the learning of Fundamental Biology by different teaching strategies.
2. To probe into any difference it may have on learning achievements between students of different interest-oriented groups and between different teaching strategies.
3. To compare any difference it may have on learning achievements between students of different teaching strategies, between different interest-oriented groups, and between different capability-oriented groups (high performance group and low performance group).

2 Methods and Procedures

There are four classes participating in the study as research samples: Concept Mapping Group (or Experiment Group)- which are taught with Concept Mapping methods- including 50 students in a social-science-oriented class and 52 students in a natural-science-oriented class, Traditional Teaching Method Group (or Control Group)- which are taught with traditional methods- including 49 students in a social-science-oriented class and 53 students in a natural-science-oriented class

Data processing and analysis in this study take the mode of quantitative data analysis and employ Statistical Products and Service Solutions (SPSS) software to run the following:

1. Comparison of difference in students' diagnostic results between different Teaching Modes.
2. Comparison of difference in diagnostic results between different interest-oriented students under the same Teaching Mode.
3. Comparison of difference in diagnostic results of same interest-oriented students between different Teaching Modes.

4. Comparison of difference in diagnostic results of high (low) performance students between different interest-oriented classes but under the same Teaching Mode.
5. Comparison of difference in diagnostic results of high (low) performance students between different Teaching Modes but in the same interest-oriented class.
6. Comparison of difference in diagnostic results of high (low) performance students between different Teaching Modes.

3 Results and Discussion

Results of this study show that diagnostic scores of student samples adopting Concept Mapping are higher than those of student samples adopting Traditional Teaching Strategy (and not influenced by different interest orientation). Analysis of variance (ANOVA) with diagnostic scores as dependent variables while teaching modes and interest orientation as independent variables reveals that different teaching strategies will cause significant difference in both natural-science-oriented and social-science-oriented students.

Conclusions of this study are as follows:

1. Whether students taught with Concept Mapping Strategy have better academic achievements than students taught with Traditional Teaching Strategy.
 - a. From t-test analysis of mean and deviation, it is found that students with Concept Mapping Strategy have better diagnostic results than the Traditional Teaching Group.
 - b. As for the performances of different interest-oriented students, there exists significant difference in the Traditional Teaching Group, but there is no significant difference in the Concept Mapping Group, which reveals that through Concept Mapping students' performances do not differ with interest orientation.
 - c. Through Concept Mapping, students have better diagnostic scores than those in the Traditional Teaching Group regardless of their interest orientation, and the difference is significant in statistics.
2. Whether the difference in interest orientation affect students' academic achievements.
 - a. Through the test of mean and deviation on diagnostic scores of different interest-oriented students in both Concept Mapping Group and Traditional Teaching Group, it is discovered that interest orientation has effect upon academic achievements in the Traditional Teaching Group, while in the Concept Mapping Group, no significant difference exists in diagnostic results between students of natural-science-oriented class and of social-science-oriented class.
 - b. When classes of the same interest orientation but under different Teaching Strategies are examined, it is discovered from diagnostic results that Concept Mapping Group has better performance than the Traditional Teaching Group.
3. Whether academic capability has effect on achievements.
 - a. No matter of which interest orientation, students taught with Concept Mapping will have better performance in diagnostic examination than those taught with Traditional Teaching strategy, and there exist significant difference between the two. A further review of diagnostic scores of high performance group and low performance group in each class discovered that in natural-science-oriented classes there is no significant difference in high performance groups between different Teaching Methods, while significant difference exists in diagnostic scores of students in other classes. (As shown in Table 1 (3) and (5))
 - b. In the Traditional Teaching Group, interest orientation has effect on students' achievements. (The natural-science-oriented class has better scores than the social-science-oriented class.) A further investigation into the difference between high performance students and low performance students in each class revealed that there exist significant difference in diagnostic scores of high performance students between different classes, while there is no significant difference in the diagnostic scores of low performance students. (As shown in Table 1 (2) and (4))
 - c. In the Concept Mapping Group, there is no significant difference in diagnostic results between different interest orientation classes. A further investigation into the difference in achievements of high performance and low performance students in each class discovered that there is no significant difference in diagnostic results between high performance students and low performance students.
 - d. After the application of different teaching methods in instruction, through the test on mean and deviation of diagnostic scores, it is discovered that students in Concept Mapping have better performance than students in Traditional Teaching Strategy. A further review of the difference in diagnostic results between high performance division (the leading 25% in ranking) made up of from high performance students of different interest-oriented classes and low performance division (the last

25% in ranking) made up of from low performance students of different interest-oriented classes having been taught with different teaching modes revealed that the performance of Concept Mapping Group is superior to that of the Traditional Teaching Group no matter it is in the high performance group or in the low performance group.

4 References

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