IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

COMPUTER BASED CONCEPT MAPPING: ITS EFFECT ON RETENTION OF SECONDARY SCHOOL STUDENTS.

Dr. Rosy S Fernandes

Associate Professor, Department of Education, Guru Kshi Univesity, Punjab.

ABSTRACT

This study was aimed at evaluating the Effectiveness of Computer Based Concept Mapping (CBCM) Instructional Strategy on Retention of Secondary School Students. CBCM is an instructional strategy that enables the learner to graphically organize the knowledge hierarchically through a widely used software called "Inspiration", which is designed specifically for education. This Experimental Research involving post-test-only Control Group Design. Achievement test constructed by the investigator and validated by experts was used to collect the data from the sample consisting of 72 secondary school students. The Experimental and Control groups had student strengths of 36 each; both groups were matched on intellectual capacity. On the basis of their intelligence, each group was further divided into Above-Average, Average, and Below Average levels, consisting of 9, 18, and 9 students, respectively. The 2-way Analysis of Variance (ANOVA) was employed for the purpose of analyzing the data. Findings of this research revealed that: 1). Students of the experimental group have sustained the Achievement in Science improved through Instructional Strategies based on Computer Based Concept Mapping. 2). All three levels, namely, Above Average, Average and Below Average students in the experimental group have sustained the Achievement in Science improved through Computer Based Concept Mapping Instructional Strategy.

Key words: *Computer Based Concept Mapping, Achievement, Retention.*

INTRODUCTION

Technology is the application of scientific knowledge; it enables students to learn better through innovative activities. Science is the systematic study of the natural world through experiment. Technology creates real-world learning experiences to make education more effective, efficient, and attractive. Learning science concepts is a difficult task. The use of a suitable strategy in the learning of science concepts helps in the true attainment of concepts. This study attempted to give students a unique learning experience by developing concept maps using technology for improving the attainment of concepts and enhancing their learning outcomes in Science. Concept Maps were constructed by Joseph D. Novak at Cornell University (1972).

Concept maps are graphical tools used for organizing knowledge systematically. They include concepts, linking lines, and linking words. Concept maps are helpful to introduce new science concepts to students; they proceed on a cognitive process of integrating new ideas with previous knowledge. Modern technology has given us the opportunity to construct Concept Mapping with the help of computers. Computer Based Concept Mapping (CBCM) is an Instructional Strategy that helps learners organize information through visual aids. It is a student-centric learning tool that enhances the Concept Attainment capabilities of students. There are a number of Concept Mapping tools available today. 'Inspiration' is one such CBCM tool used in this study.

REVIEW OF RELATED LITERATURE

CBCM Instructional Strategy has been extensively used as a teaching, learning, and evaluating tool in different disciplines. Liu, P.-L., Chen, J. C., and Chang, Y. J. (2010) conducted a study on "Effects of a computer-assisted concept mapping learning strategy on EFL college students' English reading comprehension." The results indicated that the computer-assisted Concept Mapping learning strategy enhanced learners' use of other English reading strategies–listing, enforcing, and reviewing. Vural, O. F. (2010) conducted research on the "Effectiveness of concept maps in learning from a computer-based instructional video resource." The findings discovered that there is no significant differences in the achievements of students who used either learner-generated concept maps or expert-generated concept maps. Asan, A. (2007) conducted an investigation on "Concept Mapping in Science Class: A Case Study of Fifth Standard Students." The results concluded that concept mapping has an evident impact on student achievement in science. Royer, R., and Royer, J. (2004) conducted research on "Comparing hand-drawn and Computer Generated Concept Mapping." The findings revealed that the group using the computer created more complex maps than the group that used paper or pencil. This difference was significant. Riley, N. R., and Ahlberg, M. (2004) conducted a study on "Investigating the use of ICT-based Concept Mapping Techniques on Creativity in Literacy Tasks." The findings revealed that ICT-based Concept Mapping enhances learning. Hang, K.E., Sung, Y.T., and S.F. Chen (2001) conducted a study on Learning through computer-based concept mapping with scaffolding aid." The results revealed that both the two computer-based groups achieved more than the group using paper and pencil.

OBJECTIVES

1. To find out whether the Students of standard nine retained the Achievement in Biological Science improved through Computer Based Concept Mapping Instructional Strategy.

2. To find out whether the Students of standard nine retained the Achievement in Biological Science improved through Computer Based Concept Mapping Instructional Strategy grouped in Above Average, Average and Below Average Intelligence levels.

HYPOTHESES

The null hypotheses formulated with reference to sustained Achievement in Biological Science are as follows

H01: Immediate and delayed post-test scores of the students taught through Computer Based Concept Mapping Instructional Strategy do not differ significantly with reference to Achievement in Biological Science.

H02: Immediate and delayed post-test scores of the Above Average students taught through Computer Based Concept Mapping Instructional Strategy do not differ significantly with reference to Achievement in Biological Science.

H03: Immediate and delayed post-test scores of the Average students taught through Computer Based Concept Mapping Instructional Strategy do not differ significantly with reference to Achievement in Biological Science.

H04: Immediate and delayed post-test scores of the Below Average students taught through Computer Based Concept Mapping Instructional Strategy do not differ significantly with reference to Achievement in Biological Science.

RESEARCH DESIGN

The pre-test, post-test, parallel group, 2×3 factorial design was used in the study. This is diagrammatically represented below.

Table 1: Schematic Representation of Treatments and Levels

Factor (F_B) Levels of Intelligence → / **Factor (F_A) Instructional Strategies ↓**	**L1 (Above Average)**	**L2 (Average)**	**L3 (Below Average)**
Computer Based Concept Mapping Instructional Strategy. (T_1)	n(9) $T_1 L_1$	n(18) $T_1 L_2$	n(9) $T_1 L_3$
Conventional Instructional Strategy. (T_2)	n(9) $T_2 L_1$	n(18) $T_2 L_2$	n(9) $T_2 L_3$

SAMPLE

The sample consisted of 72 students from Standard Nine. Based on their intelligence scores, matched pairs were identified and distributed into experimental and control groups, with 36 cases in each. On the basis of their intelligence, each group was further divided into 9, 18, and 9 students as Above-Average, Average, and Below Average, levels respectively.

TOOLS USED

The standardized intelligence test developed by J. C. Raven was used for the classification of groups and levels of students as Above-Average, Average and Below-Average. The Achievement Test in Biological

Science, constructed by the researcher and validated by experts, was used to measure the dependent variable achievement.

PROCEDURE OF THE STUDY

In order to avoid the inter-personal and intra-personal variation of two different teachers for the student groups, it was decided to conduct both classes by a single teacher having competence in both strategies on the same dates.

The two groups were pretested on Achievement in Biological Science. The experimental treatment involved in the teaching of a selected unit in biological science, namely, "Classification of living organisms" of Standard 9. Each lesson was for a one and a half-hour time period. The total of fifteen lessons were taught using the CBCM instructional strategy to the experimental group of students. Meanwhile, the students of the control group were taught the same lessons using Conventional Strategy. Immediately after the completion of the treatment, both groups were Post- tested on Achievement in biological science. After immediate Post testing Students continued their schooling for about a month and then delayed Post tests were conducted using the same tools to determine the retention of concepts in biological Science possessed by the students in the experimental group as a result of the treatment.

RESULTS

Analysis of Data on Sustained Achievement in Biological Science

From the findings of the above analysis, it is clear that Computer Based Concept Mapping Instructional strategy applied to Biological Science teaching is more effective when compared to conventional strategies of teaching science in terms of improving of Achievement in Biological Science among students in Standard 9. Further, the researcher intends to test whether the effects resulting from this treatment are sustained by the students.

The null hypotheses formulated with reference to sustained Achievement in Biological Science are as follows:

$H0_1$: Immediate and delayed post-test scores of the students taught through Computer Based Concept Mapping Instructional Strategy do not differ significantly with reference to Achievement in Biological Science.

To test this above null hypothesis the researcher compared the immediate post-test and delayed post-test scores on Achievement in Biological Science as a whole of the Experimental group. The scores were then subjected to 't' test. The Table-2 presents the computed and theoretical 't' values and its significance.

Table-2: Sum of Immediate Post-test and Delayed Post-test difference scores and 't' value with its significance on Sustained Achievement in Biological Science.

Since

Dependent Variable	n	∑D	$\sum D^2$	Obtained 't' Value	Theoretical Value	Significance P<0.01
Achievement in Biological Science	36	9	31	1.66	2.73	Not Significant

the obtained 't' value (1.66) is less than the tabled 't' value (2.73) with df (35) at 0.01 level of significance the difference is not significant. Hence, the null hypothesis ($H0_1$) is accepted.

Findings

This implies that immediate post-test and delayed post-test scores of Experimental group do not differ significantly with regard to Achievement in Biological Science. Therefore, it can be concluded that the students of experimental group have sustained the Achievement in Biological Science improved through Instructional Strategies based on Computer Based Concept Mapping**.**

Further, the researcher intends to test whether the effects resulted from this treatment is sustained by all the three levels of students, namely, Above Average, Average and Below Average. Hence, the hypotheses $H0_2$, $H0_3$and $H0_4$ were set up.

$H0_2$: Immediate and delayed post-test scores of the Above Average students taught through Computer Based Concept Mapping Instructional Strategy do not differ significantly with reference to Achievement in Biological Science.

$H0_3$: Immediate and delayed post-test scores of the Average students taught through Computer Based Concept Mapping Instructional Strategy do not differ significantly with reference to Achievement in Biological Science.

$H0_4$: Immediate and delayed post-test scores of the Below Average students taught through Computer Based Concept Mapping Instructional Strategy do not differ significantly with reference to Achievement in Biological Science.

In order to test these sub-hypotheses, 't' test was used. The findings are given in the Table- 3.

Table – 3: Sum of Post-test and Delayed Post-test difference scores with their significance on Sustained Achievement in Biological Science at different levels of students

Levels	N	df	∑D	$\sum D^2$	Obtained 't' Value	Theoretical Value	Significance P<0.01
Level I (Above Average)	9	8	1	3	0.55	3.36	NS
Level II (Average)	18	17	1	15	0.25	2.95	NS

Level III (Below Average)	9	8	7	13	2.4	3.36	NS

NS – Not Significant

INTERPRETATION

- **Level I (Above Average):**

Since the obtained 't' value (0.55) is less than the tabled 't' value (3.36) with df (8) at 0.01 level of significance the difference is not significant. Hence, the H01 is accepted.

- **Level II (Average) :**

Since the obtained 't' value (0.25) is less than the tabled 't' value (2.95) with df (17) at 0.01 level of significance the difference is not significant. Hence, the $H0_2$ is accepted.

- **Level III (Below Average**):

Since the obtained 't' value (2.4) is less than the tabled 't' value (3.36) with df (8) at 0.01 level of significance the difference is not significant. Hence, the $H0_3$ is accepted.

Since all the above obtained 't' values are less than the tabled 't' value at 0.01 level of significance, the difference is not significant. Hence, all the three null hypotheses $H0_1$, $H0_2$ and $H0_3$ are accepted.

Findings

This implies that the immediate post-test and delayed post-test scores of all three levels, namely, Above Average, Average and Below average, do not differ significantly with regard to sustaining achievement in Biological Science. Therefore, it can be concluded that all three levels, namely, Above Average, Average and Below Average students in the experimental group have sustained improved achievement in Biological Science improved through Computer Based Concept Mapping Instructional Strategy.

MAJOR FINDINGS

1. The students of experimental group have sustained the Achievement in Biological Science improved through Instructional Strategies based on Computer Based Concept Mapping**.**

2. Above Average, Average and Below Average students in experimental group have sustained the Achievement in Biological Science improved through Computer Based Concept Mapping Instructional Strategy.

CONCLUSION

Education is the process of gaining knowledge. Innovative methods like the CBCM instructional strategy offer benefits to both students and teachers. Concept maps allow students to think deeply about science by helping them to better understand and organize what they learn and to store and retrieve information more efficiently. Computer-based concept maps are also valuable tools for teachers because they provide

information about students' understanding. Teachers can examine how well a student understands science by observing the sophistication of their concept map.

The present study has proved that the CBCM instructional strategy is more effective when compared to the conventional strategy in improving achievement in science. This study has implications for student-centric learning. It has been found to be a systematic strategy to improve classroom instruction across various disciplines, and hence its inclusion in the teacher education curriculum will be a major step in making its application possible at the grass-roots level. Teachers of all levels need sufficient training to use CBCM software's like 'Inspiration' to improve achievement in their students. Efforts in this direction will surely bring improvements in student performance.

References

1. Asan, A. (2007). Concept Mapping in Science Class: A Case Study of fifth grade students. Educational Technology & Society, 10(1), 186-195.

2. Chang, K.E., Sung, Y.T., and Chen, S.F. (2001). Learning through Computer-Based Concept Mapping with scaffolding aid. Journal of Computer Assisted Learning, 17, 21-33.

3. Kwon, S. Y., and Cifuentes, L. (2007).Using Computers to Individually-generate vs. Collaboratively generate Concept Maps. Educational Technology and Society, 10 (4), 269-280.

4. Liu, P.-L., Chen, J. C., and Chang, Y. J.(2010). Effects of a Computer-assisted Concept Mapping learning strategy on EFL college students' English reading comprehension. Computers and Education 54, 436–445.

5. Riley, N. R., &Ahlberg, M. (2004). Investigating the use of ICT-Based Concept Mapping techniques on creativity in literacy task.Journal of Computer Assisted learning 20, 244–256.

6. Royer, R. and Royer, J. (2004). Comparing Hand Drawn and Computer Generated Concept Mapping. Journal of Computers in Mathematics and Science Teaching, 23(1), 67-81. Norfolk, VA: AACE.

7. Vural, Ö. F. (2010). Effectiveness of concept maps in learning from a Computer-Based instructional video resource. Turkey: Texas A and M University.