Research Guru
Online Journal of Multidisciplinary Subjects (ISSN : 2349-266X)
UGC Approved Journal No. 63726
Impact Factor:3.021 website: www.researchguru.net
Volume-12, Issue-2, September-2018

Effect of Concept Mapping Instruction on Problem Solving Ability of Secondary School Students of Bangalore

Dr.H.R.Jayamma
Professor, Department of Education, Jnanabharathi Campus, Bangalore University, Bangalore -560056

Sindhu.V
Research Scholar, Department of Education, Jnanabharathi Campus, Bangalore University, Bangalore -560056

Abstract

Research study presented here is to investigate the effect of Concept Mapping Instruction on Problem Solving Ability of Secondary School students studying in Bangalore. In the study Concept Mapping Instructional Package has been specifically prepared by the researcher on the school subject Chemistry. The present research study adopted the experimental design to carry out the study. The sample selected for the study represents both male and female students from Secondary School of Bangalore. The present study had control group and experimental group. The Concept Mapping Instructional Package in Chemistry was used on experimental group to compare their Problem Solving Ability with the control group taught in traditional method. The present study found that, the Problem Solving Ability of experimental group significantly differed from the control group. The Problem Solving Ability of experimental group was found to be higher than the control group.

Keywords: Problem Solving Ability; Concept Mapping; Concept Mapping Instructional Package.

Introduction

World is rapidly changing due to inventions, discoveries and change in the environment. Demands from human being from the mother earth have left no geographical area unearthed. Therefore the problems and challenges to fulfill the human needs have also increased enormously. In order to tackle these challenges there is a need to educate people in scientific thinking and problem solving skills through science education. Science education has the potential to enhance Problem Solving Ability of an individual and therefore newer method to enhance Problem Solving Ability has to be explored. Educators in the globe have to work in finding out the newer method of teaching and learning to strengthen the Problem Solving Ability of the learner. Problem Solving Ability will increase with the increase in critical thinking skills and decision making skills. Concept mapping as a method of instruction improves critical thinking skills and decision making skills (Harris and Zha, 2013). The study conducted by Hassan et.al (2015) has found out that Concept Mapping intervention has enhanced decision making skills.

Science teaching in the globe must stimulate critical thinking ability to solve the newer problems of the world. Chemistry is a very dynamic subject through its systematic mechanisms of chemical reactions and synthesis has scope for teaching critical thinking, decision making and thereby enhancing Problem Solving Ability.

One of the well-known scientific methods of learning is inquiry based learning and gradually these days blended teaching has also been introduced to teach science in classroom (Dean 2008). Concept Mapping, as a strategy to learn science to avoid rote memory has achieved its findings in many researches these days (Novak, 2004). However in India not many who have tried to assess the achievement and Problem Solving Ability through this method. Therefore the present study has been taken to see whether the Concept Mapping intervention can improve Problem Solving Ability of a learner when taught through Concept Mapping Instructional Package.

Need for assessing Problem Solving Ability through Concept Mapping Intervention.

In Science education concepts find a special place, no matter how much ever innovations happen in the field of science and technology, basic concepts remain unaltered and are to be taught first to build any new knowledge. Thinkers have explored concept at various levels such as concept formation, concept attainment, and concept application and so on. Concept Mapping as a tool to learn as well as to teach and now used in various ways; as assessment tool (Soika and Reiska, 2014), as pedagogical tool, as reflection process etc. Kinchin and Lygo-Baker (2008) have explored how Concept Mapping can be used to understand abstract knowledge.

In the present study researcher has made an attempt to understand how Concept Mapping influences achievement in science subject and also how Concept Mapping intervention affect Problem Solving Ability of learners. Researcher believed that when Concept Mapping can support learning of abstract science concepts it could also be able to strengthen Problem Solving Ability. In order to test this hypothesis present research has been taken up by the researcher.

Methodology

Present study has adopted experimental design to test the Problem Solving Ability of the learners through Concept Mapping intervention. Concept Mapping Instructional Package in the present study comprised of concepts from the subject Chemistry. Some of the concepts chosen are from 8^{th} standard school syllabus viz., Structure of Atom, More about Atoms, Chemical Reactions and their Types, Chemicals in our Daily Life etc. In order to test the Problem Solving Ability through Concept Mapping Instructional Package researcher had chosen a sample of 72 students of which 36 students belonged to the experimental group and 36 students belonged to control group. Both experimental and control group had male and female students who were almost equally distributed. The study follows experimental design with two groups control and experimental. The students in each group were randomly chosen. The study design followed a pre-test and post-test method to both control and experimental group. Experimental group were instructed based on the Concept Mapping Instructional Package developed by the researcher and the control groups were instructed as usual with traditional approach.

Statistical test conducted to find the significant difference in Problem Solving Ability between the experimental and control group is, paired sample t-test using SPSS software version 21. This article presents the t-test results between pre-tests of Problem Solving Ability between Control group and Experimental group and also t-test between post-tests of Problem Solving Ability between control group and experimental group.

Results

Statistical results and interpretations of the major hypothesis of the present study are tabulated in the tables 1 and 2 respectively.

Table 1 showing the t-test output between pre-tests of Problem Solving Ability between Control group and Experimental group

Problem Solving Ability Pre-tests	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI				
				Lower	Upper			
Control – Expt.	0.667	2.630	0.438	-0.223	1.556	1.521	35	0.137

From the table 1 it is clear that, there is no significant difference between pre-test scores of Problem Solving Ability between control group and experimental groups. It shows that the groups were almost similar in their Problem Solving Ability prior to the intervention. It is quite evident from the mean scores of control and experimental group. Mean score of pre-test Problem Solving Ability of experimental group was found to be 3.92 and the mean score of pretest of Problem Solving Ability of control group was found to be 4.58.

Table 2 Showing the T-test output between Post-tests of Problem solving ability between Control group and Experimental group

Problem Solving Ability Post tests	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI				
				Lower	Upper			
Control-Expt.	-1.833	2.699	0.450	-2.747	-0.920	-4.075	35	0.000

Results tabulated in Table 2 shows that, there is a significant difference between post-test scores of Problem Solving Ability between control group and experimental group. It shows that the groups differed significantly in their Problem Solving Ability after the intervention. It is quite evident from the mean scores of control and experimental groups. Mean score of post-test Problem Solving Ability of experimental group was found to be 6.33 and the mean score of post-test of Problem Solving Ability of control group was found to be 4.50 shows that the teaching through Concept Mapping Instructional Package has enhanced the Problem Solving Ability of the students than teaching through traditional method.

Conclusion

Findings of the present study show that there is an improved Problem Solving Ability among students when instruction is given using Concept Mapping method over the traditional teaching method. The results were in concurrent with the results explored in the reviews by the researcher on science subject and commerce subjects such as engineering and management respectively. Researcher finds that Concept Mapping Instructional Method as potential method to enhance Problem Solving Ability among students. Enhancing Problem Solving Ability among such young minds will certainly be helpful in solving societal problems and challenges in the future. Researcher also suggests that future researchers have to explore further taking

large and radial sample and also in terms of developing Problem Solving Ability on arts and other school subjects.

References

All, A. & Havens, R. (1997). Cognitive/Concept mapping: A teaching strategy in nursing, Journal of Advanced Nursing. 25(6), 1210-1219.

Ausebel. D.P. (1966). Meaningful reception learning and the acquisitions of concepts. In Klausmeeirer H.J. and Harris. C.W. (eds). Analysis of concept learning (157-175). Academic Press. New York & London.

Beissner Katherine L (1992), Use of Concept Mapping to Improve Problem Solving. Journal of Physical Therapy Education.

Cañas A., Novak, J. & Gonzalez, F. (2004). Concept maps, theory, methodology and technology. Spain. Proceeding of the first International Conference on Concept Mapping.

Dean, A.Z. (2008). Teaching and learning physics with interactive video. Lincoln, USA.

Dorien J. de Tombe (2010) DEVELOPING PROBLEM SOLVING SKILLS, European Journal of High Ability, 2:1, 18-27.

Ge, Xun, Land & Susan M. (2003). Scaffolding Students' problem-solving processes in an ill- structured task using question prompts and peer interactions. Educational Technology Research and Development, 51 (1), 21-38.

Harris, C. M. & Zha, S. 2013. "Concept Mapping: A Critical Thinking Technique", Education, vol. 134, no.2, pp. 207-211.

Hassan, I. S., Al Somaili, M., Al Khathami, A., & Al Ghobain, M. Salih Bin Salih. 2015. "A Before-After Study of Generic Contextual Diagnostic Labelling and Immediate Therapeutic Interventions Concept Maps for Decision Making", Education in Medicine Journal, vol. 7, no. 1, pp. 30- 37.

Jonassen, D. H. (1997). Instructional Design Models for Well-Structured and Ill-Structured Problem-Solving Learning Outcomes. Educational Technology Research and Development, 45 (1), 65-94.
Journal of Advanced Nursing, 25(6), 1210-1219.

Novak, J. & Canas, A. (2006). The Theory Underlying Concept Maps and How to Construct Them. Florida Institute for Human and Machine Cognition: Technical Report IHMC Cmap Tools 2006-01.

Prabir K. Sarker. (2015). Curtin University, Perth, Australia. Use of concept maps for problem-solving in engineering. Global Journal of Engineering Education. Volume 17, Number 1, 2015.

Schmid, Richard & Telaro, Giovanni. (2015). Concept Mapping as an Instructional Strategy for High School Biology. The Journal of Educational Research. 84. 78-85.