EFFECTIVENESS OF CONCEPT MAPPING AS A TOOL IN LEARNING VIII STANDARD GEOMETRY

Shailaja P. Shanbhag

Mathematics being an important and compulsory subject, quality mathematics education should be made accessible to all the children. NCF–2005 has viewed children as active constructors of knowledge and strictly advocates the use of various types of methods, activities and tools to help students construct their own knowledge. Concept mapping is one of the innovative teaching tools that can clarify and deepen students understanding of the content. Concept mapping skill is an enabling skill to enhance the development of students’ thinking skills through more meaningful learning activities. The study was undertaken with the Objective of studying the effectiveness of concept mapping as a teaching tool in attainment of geometry content and development of concept mapping skill and to study the gender difference in attainment of geometry content and development of concept mapping skill among VIII standard students. The study is pre-test, Post-test quasi-experimental study. The study revealed that concept mapping as a teaching tool is effective in attainment of VIII standard geometry content and developing concept mapping skill. Findings of the study are in agreement with the findings of several studies conducted earlier.

INTRODUCTION
Mathematics plays an important role in school learning and also assumes a prominent position in modern education and curriculum. Mathematics is the science of all sciences and art of all arts. For learning almost all subjects a strong foundation in mathematics is needed. It is a science of logical thinking and systematic reasoning. Mathematics is taught on a compulsory basis to all pupils as a part of general education during the first ten years of schooling. Study of mathematics provides intellectual stimulation and makes a person efficient in coping with the
demands of the quantitative aspects of his/her day-today life (Aiyanagar 1973). So, study of mathematics cannot be undermined.

Geometry is one of the branches of mathematics and is concerned with space and shape which forms the basis of all things that exist. Understanding geometry is necessary in understanding how the world is built. Geometry holds an important place in the mathematics curriculum. We need to learn about shapes as a part of our every day vocabulary because many common objects are in different geometrical shapes. We need geometry to understand the physical world and develop the spatial awareness. Within geometry, point, line, line segment and different geometrical figures are organised just as the arrangement of bricks one over the other in building a wall. The implication of this hierarchical arrangement is that students can grasp mathematics properly if he or she understands the relationships among different geometrical concepts, rules, axioms, generalisations etc.

Mathematics in general and geometry in particular should be carefully built in different levels of school education through the pedagogy of mathematics. Teachers should use various methods, techniques and tools for making teaching and learning of mathematics effective. Through major reforms in teaching, teachers can focus on educating and improving the quality of teaching of mathematics.

Concept mapping is one of the innovative teaching tools that can clarify and deepen students understanding of the content. Concept mapping skill is an enabling skill to enhance the development of students’ thinking skills through more meaningful learning activities. Concept mapping skill once learned can help students to recognise what they know and think in more systematic and complex ways.
'Concept maps are spatial representation of concepts and their relationships that are intended to represent the knowledge structures that human beings store in their minds' (Jonassen, Beissner and Yacci-1993). Joseph D. Novak of Cornell University is considered to be the one who in the 1960’s started systematic use of concept mapping for learning. His work was based on the important ideas of Ausubel’s (1968) assimilation theory of cognitive learning. According to him, most new learning occurs through derivative and corrective subsumption of new concept meaning under existing concept or propositional frameworks. Cognitive structure is organised hierarchically with new concepts or concept meanings being subsumed under broader, more inclusive concepts. Novak defines concept map as ‘a systematic device for representing a set of concepts, meanings embedded in a framework of proposition’.

NEED AND IMPORTANCE OF THE STUDY
National Curriculum Framework–2005 (NCF–2005) recommends teaching for construction of knowledge. In the constructive perspective, learning is a process of construction of knowledge. Learners actively construct their own knowledge by connecting new ideas to existing ideas on the basis of materials or activities presented to them. The structuring and restructuring of ideas are essential features as the learner progresses in learning. This has significant implications for teaching and learning of mathematics.

Universalisation of schooling also has important implications for mathematics teaching. Mathematics being such an important and compulsory subject, quality mathematics education should be made accessible to all the children. NCF–2005 has viewed children as active constructors of knowledge and strictly advocates the use of various types of methods, activities and tools to help students construct their own knowledge.
In concept mapping, material to be learned becomes conceptually very clear. For learning to take place, students have to actively involve themselves in learning. In this background the researcher has made an attempt to study the effectiveness of concept mapping as a teaching tool for teaching and learning VIII standard geometry.

OBJECTIVES OF THE STUDY
1. To study the effectiveness of concept mapping as a tool in attainment of geometry content of VIII standard students.
2. To study the effectiveness of concept mapping as a tool for studying the concept mapping skill of VIII standard students in learning geometry.
3. To study the gender difference in attainment of geometry content among VIII standard students as a result of learning through concept mapping as a teaching tool.
4. To study the gender difference of VIII standard students in concept mapping skill in representing geometry content.

HYPOTHESES
1. Concept mapping as a teaching tool is effective in attainment of VIII standard geometry.
2. Concept mapping as a teaching tool is effective in developing concept mapping skill in geometry of VIII standard students.
3. Concept mapping as a teaching tool has no differential effect on gender in attainment of geometry content of VIII standard students.
4. Concept mapping as a teaching tool has no differential effect on gender in the development of concept mapping skill in geometry of VIII standard students.

VARIABLES OF THE STUDY
Independent variables in the study are: 1. Concept mapping as a teaching tool in learning geometry and 2. Gender. Dependent
variables in the study are: 1. Attainment of geometry content; and 2. Development of concept mapping skill.

**METHODOLOGY**

The present study is pre-test, Post-test quasi-experimental study. Study consisted of two groups, one experimental and other conventional group. The experimental group was taught using concept mapping as a teaching tool involving the development of concept maps along with other supporting materials to teach and the other group was taught by conventional method (lecture method).

**Sample**

The Sample of 39 (18 girls and 21 boys experimental group) and 37 (19 girls and 18 boys conventional group) VIII standard students were selected following purposive cluster sampling technique.

**Tools**

Achievement test was developed to measure the pre-requisite knowledge of the students related to the content considered for developing teaching learning material using concept mapping as a teaching tool and for conventional teaching. Concept mapping test was developed to measure the concept mapping skill with the students. Achievement test and concept mapping test (based on VII standard geometry) both are pre-tests and administered to both experimental and conventional group students. One more achievement test was constructed to measure the attainment of VIII standard geometry content and concept mapping test to measure the development of concept mapping skill of the both group students. Both these tests were post tests and administered to both the groups and constructed based on the VIII standard selected geometry units.
PROCEDURE

In the first part tools were developed and lesson plans were prepared for teaching the VIII standard geometry units—theorems on triangles, congruency of triangles, quadrilaterals using concept mapping as a teaching tool for teaching experimental group students. For teaching conventional group students lesson plans were prepared to teach the same units of VIII standard geometry for same number of periods. For teaching experimental group students concept maps were developed for every lesson as well as for the entire units as a part of teaching. This includes super ordinate, co-ordinate and sub-ordinate concepts, relationship links and other links in hierarchical order.

In the second part achievement test is constructed based on VII standard geometry to measure the pre-requisite knowledge with the students and concept mapping test to study the concept mapping skill with the students. These tests were administered as pre-tests to both the group students. Average (mean) marks obtained by students on pre-tests of both the groups of VIII standard were calculated. Significant difference between the means of these two groups or sections on both the tests was calculated. Differences between the means on both the pre-tests (achievement test ‘t’ value is 0.538 and concept mapping test ‘t’ value is 0.436) were not significant at 0.05 level. Hence both groups were considered as matched groups. Then one group was randomly selected as experimental group and other group as conventional group. Then both the group students were taught for 25 days (each day one period of 40 minutes duration). Conventional group students were taught using conventional method (lecture method) and experimental group students were taught using concept mapping as a tool for teaching.

After the intervention achievement test constructed based on the VIII standard geometry units selected for teaching to both the groups and concept mapping test to study the development
concept mapping skill on the same geometry units were administered to both the group students. Necessary data were collected to study the effectiveness of concept mapping as a teaching tool and data was analysed using ‘t’ test.

**DATA ANALYSIS AND RESULTS**

1. **Effectiveness of concept mapping as a teaching tool in attainment of geometry content.**
   Analysis of the data revealed that concept mapping as a teaching tool is effective in attainment of VIII standard geometry content. The findings of the study revealed that concept mapping as a teaching tool significantly (‘t’ value-9.56) improves the attainment of VIII standard geometry content.

2. **Effectiveness of concept mapping as a teaching tool in developing the concept mapping skill.**
   The findings (‘t’ value-13.31) of the study revealed that concept mapping as a teaching tool is effective in developing concept mapping skill among VIII standard students while learning geometry content. In the beginning students were finding it difficult to represent the concepts, laws, generalizations, branching, cross links and hierarchical arrangements in drawing concept maps. Gradually they have developed concept mapping skill for the given data i.e. they were able to provide proper cross links and relationships of concepts, rules, generalizations, formulae etc.

3. **Study of gender difference of VIII standard students in attainment of geometry content and development of concept mapping skill.**
   The results obtained from the study (‘t’ value of 0.707 for achievement and ‘t’ value of 0.76 for the development of concept mapping skill) indicated that there is no significant difference between boys and girls of VIII standard in attainment of geometry
content and concept mapping skill that have learnt through concept mapping as a teaching tool.

CONCLUSION
In conclusion it can be said that concept mapping as a teaching tool is effective in improving the achievement of VIII standard student geometry content and concept mapping skill. Findings of the study are in agreement with the findings of several studies conducted earlier.

REFERENCES