Chapter V

SUMMARY AND CONCLUSION.
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In the previous chapter introduction of the problem, development of tools, method of study and interpretation of the data were discussed. The present chapter has been devoted to the summary and conclusion. For providing the back ground of the finding, a brief description of the purpose, design and procedure, along with the educational implications and suggestions for the further research have been given.

INTRODUCTION

There is mention of environment and its importance in many ancient literatures. However the beginning of environmental education can be traced to educational thinkers such as Froebel, Montessori and Dewey who had put emphasis on the learner and learning environment, on learning by doing and participation of differential learning needs and styles. With increase in the knowledge of science and technology and initiation of industrial activities, in the last part of the nineteenth century, there has been increasing awareness to protect air, water, land, forests and aquatic resources.

In true sense of the term, the origin of environmental concept goes back to (1899) Patrick Geddes, father of environmental education to improve environment. Such beginning was strengthened by subsequent global catastrophic events such as London smog of 1952, Mina-mata tragedy of 1953 and the Torry Canyon disaster of 1967 etc. that forced people to become conscious about the state of global environment. United Nations Conference on Environment and Development (UNCED, 1992) known as ‘Earth Summit’ held at Rio-de-Janeiro in 1992 endorsed the concept of sustainable development and the global environmental concern came into sharp focus. Despite considerable
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global efforts made by representatives from all the sections of society, the conservation of natural resources has failed to keep pace with environmental degradation. The latest information furnished by Earth II summit, September 2002 reveals a planet still in the need of intensive care. Poverty, population and pollution are the three pressurizing planet’s life support system by creating environmental crisis globally threatening our ability to achieve sustainable development.

According to the findings of a scientific panel constituted by the United Nations Environment Programme (UNEP), a vast blanket of pollution, 3 km thick, has settled over South Asia and has become “a major environmental hazard for the region” caused by the dramatic increase in the burning of fossil fuels in Asian Countries in the past decades, the haze is said to have a serious impact on the continents climate and weather pattern containing a mass of ash, acids and aerosols, the haze is so thick that it blocks the amount of sunlight hitting the earth by as much as 15%. It has caused a reduction in rain-fall by 20-40% in North-West India, Pakistan, Afganistan and Western China. As learnt from Australia’s CSIRO and the Bureau of Meterology in Tasmania, the Antarctic Ozone hole is shrinking which is expected to close by 2050. A new Ozone hole over the North pole in the Arctic region is developing since the 1970’s. Environmental hazards still kill at least 3 million children under 5 years of age every year.

The holiest river Ganga of India is heavily polluted and the major source of pollution is the discharge of community wastes form human settlements. Now 2.4% of the world’s forest have been destroyed and 2/3 of the world’s farm lands suffer from soil degradation. At the current rate of distribution, it is estimated that 40% of what remained would be lost in 10 to 20 years. About 75% of the world’s marine captures is over fished or fully utilized.
Marine Pollution

Marine debris in Great Nicobar is another ecological problem. The two thousand nuclear detonations which have been done in underground, under ocean and in atmosphere, have raised the cumulative radioactivity level in oceans. The loss of biodiversity is another major environmental crisis. The growing population and mismanagement of forest habitats, especially flora and fauna have caused gradual loss and destruction of forest ecosystem.

This exploding population has put immense pressure on geosocial infrastructure in the country and has accentuated strain on its environment. The consequence in biological, ecological and atmospheric environmental degradation has direct impact on the quality of life of living organisms and depletion of natural resources. The environmental degradation in India varies from place to place depending on the density of population, consumption behaviour of the inhabitants and availability of natural resources in that specific region.

With the continued degradation of environment set against the backdrop of exploding population and resulting poverty, it is only the explosion of awareness on environmental concerns among the young school going boys and girls to prevent the explosion of ecological degradation well in time.
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Environmental education can be instrumental in bringing about such awareness. It is the time when environmental education should exploit all avenues to harness the energies of the common masses to stop the nation’s heading towards an environmental disaster.

The principle aim and objective in this regard will be to focus on mass involvement and an awareness education with information facilitation for creating a sense of environment consciousness within the minds of the people. Today, there is a growing awareness that investment in environment is an investment for a more secure future. To conclude, there is a realization that the present generation has a right to enjoy the natural resources and it must be passed on to posterity without any impairment to these resources.

The action of an individual or society that has an impact on other societies contributes to global environmental issues. The basic question underlying all the global environmental issues is a question of awareness. Environmental awareness is the sensitivity to the total environment and its allied problems. The development of environmental awareness means to understand the environmental concepts and to develop critical thinking. Awareness includes making the individual conscious about physical, social and aesthetic aspects of the environment. Environmental awareness is a comprehensive term which is influenced by different variables like attitude, interest, personality, achievement motivation and cognitive style etc. We need to explore interdependence of these variables in creating and strengthening of environmental awareness of the individuals. Achievement motivation has direct bearing on environmental awareness along with cognitive style of the learner. Achievement motivation is a tendency to maintain and increase individual proficiency in different areas. Achievement motivation is a learned behaviour, which is associated with stable personality characteristics and each individual constantly possesses a motive to achieve success.

Different domains of motivation (affective, cognitive and moral) and intrinsic, extrinsic and achievement factors as well as fear of failure have been
found to relate to qualitative differences in approaches to learning and studying. It is imperative that teachers should focus on individual differences, growth patterns, and cognitive styles while providing educational experiences that develop the physical, social, emotional and cognitive domains without regard to other factors. Various researches affirm that concept mapping develops thinking skills, creativity, concept acquisition, and social and emotional development. With proper method, the teacher can guide and motivate students into choosing to complete the task and to acquire the concept. To ascertain the environmental awareness of the learners we use different tools and concept mapping has emerged as a productive and functional tool in the present scenario.

Based upon Ausubel’s theory of meaningful learning, the different studies focussed on the use of concept mapping as teaching method to help students to identify logical relationships between a new concept and concepts already known. The concept map provides a graphic visual of structural knowledge, extends working memory. The concept mapping forces critical thinking and accordingly, enhance the externalization of interrelationships amongst concepts. The concept maps also enhance metacognition. Therefore, in order to find out the acquisition of environmental awareness through concept mapping among IX graders in relation to achievement motivation and cognitive style, the present study was carried out.

STATEMENT OF THE PROBLEM

ACQUISITION OF ENVIRONMENTAL AWARENESS THROUGH CONCEPT MAPPING AMONG IX GRADERS IN RELATION TO ACHIEVEMENT MOTIVATION AND COGNITIVE STYLE

DELIMITATIONS OF THE STUDY
1. The study was restricted to the government schools of Chandigarh only.
2. The present investigation was conducted on the sample of IX graders only.
3. The study was conducted on 400 students only.
OBJECTIVES
1. To develop and validate concept mapping as instructional material for teaching environmental awareness.
2. To study the effect of instructional strategy (concept mapping/conventional method) on acquisition of environmental awareness among IX graders.
3. To study the effect of achievement motivation on acquisition of environmental awareness among IX graders.
4. To study the effect of cognitive style on acquisition of environmental awareness among IX graders.
5. To study the interaction effect of instructional strategy (concept mapping/conventional method) and achievement motivation on acquisition of environmental awareness among IX graders.
6. To study the interaction effect of instructional strategy (concept mapping/conventional method) and cognitive style on acquisition of environmental awareness among IX graders.
7. To study the interaction effect of achievement motivation and cognitive style on acquisition of environmental awareness among IX graders.
8. To study the interaction effect of achievement motivation, cognitive style through instructional strategy (concept mapping/conventional method) on acquisition of environmental awareness among IX graders.

HYPOTHESES
The following hypotheses were formulated and tested:

H₀₁ There will be no significant effect of instructional strategy (concept mapping/conventional method) on acquisition of environmental awareness among IX graders.

H₀₁ₐ There will be no significant effect of instructional strategy (concept mapping/conventional method) on acquisition of environmental awareness among boys of IX grade.
H\textsubscript{0}1b There will be no significant effect of instructional strategy (concept mapping/conventional method) on acquisition of environmental awareness among girls of IX grade.

H\textsubscript{0}2 There will be no significant effect of achievement motivation on acquisition of environmental awareness among IX graders.

H\textsubscript{0}2a There will be no significant effect of high achievement motivation on acquisition of environmental awareness among boys of IX grade.

H\textsubscript{0}2b There will be no significant effect of low achievement motivation on acquisition of environmental awareness among boys of IX grade.

H\textsubscript{0}2c There will be no significant effect of high achievement motivation on acquisition of environmental awareness among girls of IX grade.

H\textsubscript{0}2d There will be no significant effect of low achievement motivation on acquisition of environmental awareness among girls of IX grade.

H\textsubscript{0}3 There will be no significant effect of cognitive style on acquisition of environmental awareness among IX graders.

H\textsubscript{0}3a There will be no significant effect of convergent cognitive style on acquisition of environmental awareness among boys of IX grade.

H\textsubscript{0}3b There will be no significant effect of divergent cognitive style on acquisition of environmental awareness among boys of IX grade.

H\textsubscript{0}3c There will be no significant effect of convergent cognitive style on acquisition of environmental awareness among girls of IX grade.

H\textsubscript{0}3d There will be no significant effect of divergent cognitive style on acquisition of environmental awareness among girls of IX grade.

H\textsubscript{0}4 Interaction effect of instructional strategy (concept mapping/conventional method) and gender will not be significant on acquisition of environmental awareness among IX graders.

H\textsubscript{0}5 Interaction effect of instructional strategy (concept mapping/conventional method) and achievement motivation will not be
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significant on acquisition of environmental awareness among IX graders.

H06 Interaction effect of achievement motivation and gender will not be significant on acquisition of environmental awareness among IX graders.

H07 Interaction effect of instructional strategy (concept mapping/conventional method) and cognitive style will not be significant on acquisition of environmental awareness among IX graders.

H08 Interaction effect of cognitive style and gender will not be significant on acquisition of environmental awareness among IX graders.

H09 Achievement motivation and cognitive style do not interact significantly on acquisition of environmental awareness among IX graders.

H010 Interaction of achievement motivation and gender through instructional strategy (concept mapping/conventional method) will not be significant on acquisition of environmental awareness among IX graders.

H011 Interaction of cognitive style and gender through instructional strategy (concept mapping/conventional method) will not be significant on acquisition of environmental awareness among IX graders.

H012 Interaction of gender, achievement motivation and cognitive style will not be significant on acquisition of environmental awareness among IX graders.

H013 Interaction of achievement motivation, cognitive style through instructional strategy (concept mapping/conventional method) will not be significant on acquisition of environmental awareness.

H014 Interaction of gender, achievement motivation and cognitive style through instructional strategy (concept mapping/conventional method) will not be significant on acquisition of environmental awareness.
EXPERIMENTAL PROCEDURE

The experiment was conducted in four phases:

Phase-I

Achievement Motivation Scale and Joyce-Hudson Scale of convergence and divergence were administered in each school in order to identify the levels of achievement motivation and cognitive styles of students.

Phase-II

A pretest was administered to the students of the control group and treatment group to know information regarding the previous knowledge of the students.

Phase-III

The students were given treatment through concept mapping in the respective group. Group II was taught through conventional method. The teaching was carried out for 45 sessions.

Phase-IV

After the end of treatment both the control and experimental group were tested by administering a post test (EAAM).

TOOLS USED

In the present study, following tools were used to collect the relevant data:

1. Instructional material for concept mapping (developed by investigator).
2. Environment Awareness Ability Measure developed and standardized by Jha (1998).
3. Achievement Motivation Scale constructed and standardized by Deo and Mohan (1985) and Published by National Psychological Corporation, Agra, was used to classify students into different levels of achievement motivation.
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4. The Joyce- Hudson scale of convergence and divergence by Child and Smithers (1973) was used to identify the cognitive styles of the students.

SAMPLE

The study was conducted on a sample of 400 students of IX class both boys and girls drawn from Govt. schools of Chandigarh. Random sampling technique was used for selection of the sample. Two schools were selected from total schools of Chandigarh having at least two sections. About 100 students were selected from each school.

DESIGN OF THE STUDY

The present study was experimental in nature. The study was designed to study the effect of concept mapping on acquisition of environmental awareness among IX graders in relation to achievement motivation and cognitive style. Experimental method was employed in the form of pre-test and post-test factorial design by involving two groups—one experimental group and one control group.

Group-I (Experimental group) was presented instructional material by using concept mapping. And Group-II (Control Group) was presented instructional material by conventional method.

In order to analyze the data four way (2x2x2x2) analysis of variance was used for two independent variables.

(A) Achievement Motivation
(B) Cognitive Style

The variable of achievement motivation was studied at two levels, namely high and low achievement motivation. The variable of cognitive style was studied at two levels i.e. convergent and divergent.

STATISTICAL TECHNIQUES

Descriptive statistics such as mean, median, mode, standard deviation were worked out to study the general nature of the sample in relation to
dependent variable i.e. acquisition of environmental awareness viz through concept mapping treatment, achievement motivation and cognitive style.

Skewness, kurtosis and their standard error were worked out to see the trend of departure of the sample distribution from the normal probability curve. t-test was applied to find out the significance of difference between means related to different groups and different variables. Analysis of Variance (ANOVA) was used to test the hypotheses related to achievement motivation and cognitive style.

MAJOR FINDINGS

1. Two instructional strategies- concept mapping and conventional method produced significant variation among the mean achievement scores of the learners of experimental and control groups. Thus, achievement is affected by the different instructional strategies adopted by teacher.

2. Students taught by concept mapping method used by teacher acquired and retained more concepts of environmental awareness than those students who were taught by conventional method.

3. The students having different levels of achievement motivation produce differences in the acquisition of environmental awareness concepts, of the facts that they are exposed to any strategies of instruction.

4. High achievement motivation group and low achievement motivation group do not show much difference but high achievement motivation group is considered effective in acquisition of environmental awareness concepts.

5. Cognitive style of students stands for the difference in achievement of the learners of two groups.
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6. Divergent cognitive style group scored higher mean scores and is considered to be much effective in the acquisition of environmental awareness concepts than convergent cognitive style group of learners of all the two groups.

7. Gender has also significantly influenced the acquisition of environmental awareness concepts. There is a significant difference in mean scores of boys and girls.

8. Students with higher achievement motivation are not so much higher on achievement than students with low achievement motivation in concept mapping and conventional method instructional strategies. But students with higher achievement motivation may show higher acquisition of environmental awareness in concept mapping strategies of instructions, but different levels of achievement motivation may act as reduction factor towards acquisition in conventional method of teaching.

9. Boys and girls with different levels of achievement motivation do not show significant differences in acquisition of environmental awareness concepts. Boys and girls show equal achievement in concept mapping strategies of instructions.

10. Divergent cognitive style and high achievement motivation show more environmental awareness than convergent cognitive style and low achievement motivation in concept mapping strategies of instructions than conventional method.

11. Low achievement motivation and convergent cognitive style have shown marked environmental awareness with conventional method of teaching.

12. The interaction between instructional strategies and different levels of achievement motivation was not found to be significant to
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produce differential achievement in acquisition of environmental awareness.

13. The interaction between instructional strategies and gender do not show significant effect in achievement.

14. The interaction between instructional strategies and cognitive style show marked effect in acquisition of environmental awareness.

15. The interaction between achievement motivation and gender do not show significant effect in achievement.

16. The interaction between cognitive style and gender do not account for difference in the achievement but show marked effect in acquisition of environmental awareness.

17. Achievement motivation and cognitive style do not show significant interaction effect in acquisition of environmental awareness.

18. The interaction effect among instructional strategies, gender and achievement motivation do not account for large difference but show marked difference in achievement and interacted slightly to produce variation in the achievement of students.

19. The interaction effect among instructional strategies, cognitive style and gender did not show significant result in the acquisition of environmental awareness.

20. Gender, achievement motivation (high and low) and cognitive style (convergent and divergent) did not interact significantly to produce variation in the achievement of students. But showed marked effect in the acquisition of environmental awareness concepts.

21. Instructional strategies, achievement motivation and cognitive style did not interact significantly to produce variation in the acquisition of environmental awareness of students.
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22. Instructional strategies, gender, achievement motivation and cognitive style did not interact significantly to show variation in the acquisition of environmental awareness of students.

23. Concept mapping instructional strategy was found to be more effective with divergent cognitive style than conventional method in acquisition of environmental awareness.

EDUCATIONAL IMPLICATIONS OF THE FINDINGS

The concern regarding environmental protection is too serious to be left to the government, planners, non-government organizations and even social activists alone. Each one of us need to put in our part, however small it may be. The findings of the present study have some very important implications, for improving the quality of instructions and teaching methods.

1. The concept mapping strategy acts as a useful tool for enhancing the performance of students in any subject. It helps to motivate the students to continue their learning process interestingly. Learning in different subjects takes place by the assimilation of new concepts and propositions into existing concepts held by the learner.

2. The concept mapping method has the potential to bring about increased thinking ability and achievement in environmental education as well as other subjects being taught in the schools curriculum viz physics, chemistry, biology, social studies etc.

3. The educational institutions can act as the source of knowledge and information about the environment. Education on environmental awareness and ecological systems should be the primary task of universities and schools. Environmental awareness programmes may help in enhancing environmental education programmes.

4. Environmental education should have environmental issues, environmental situations, learning experiences, environmental
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sensitivity, diverse learning environment and educational approaches. Environmental educational programmes depend upon many factors such as: nature of guidelines, structure of curriculum, administrative talent, interest, teaching personnel and their commitment, student's values, interests and abilities, facilities and equipments, type of community surrounding the institution.

5. The school programmes can be developed to a greater extent, around environmental questions that affect our lives. There should be individual and joint efforts to awaken environmental consciousness through research activities, seminars, workshops and other common forms. In addition, efforts should be made to make pupils aware of the factors, related to eco-system, wild life and misuse of resources and need for their recycling, population explosion, food problems, conservations on the one hand and food chain, biosphere on the other.

6. The school and colleges can organize and conduct activities environmental themes by holding seminars, discussions, awareness camps, rallies, street theatre. They should also set up eco-clubs at various levels.

7. Committees including the students, teachers and administrators should be appointed to establish and evaluate the environmental education programmes. Adequate infrastructure, funds, trained personnel and national level policies should be required for making these programmes successful.

8. Eco-technology and Ecological Modernization of industry may help to raise the levels of both ecological and economic efficiency by increasing material and energy effectively in production and consumption process in order to minimize the expense on environmental protection while...
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keeping the cost of natural resource exploitation within acceptable limits.

9. Print media may have a great role in informing and educating the people with various issues. It is a platform considered as fourth estate in democracy which ventilates the grievances and feelings of masses through innovative writings and various news analysis. Newspaper, magazine and various other periodicals have a wide reach.

10. New schemes like ‘Paryavaran Vahini’ which was launched in (1992-93) to create environmental awareness and to ensure active public participation by involving local people in the activities related to environmental protection should be further strengthened.

11. Environmental education can help the teacher trainee to learn about measures of protection of environment, knowledge on ecological balance, respect towards nature, how to solve the social, physical environmental problems. Environmental education programme must have Environmental studies, Environmental Science, Environmental Engineering, and knowledge can be implemented through formal and non-formal education system.

12. Various environmental issues such as: creating awareness about adverse effects of pollution, knowing about extinction of species, promoting long-term sustainability, avoiding wasteful consumption, consumerism, inculcating love of simplicity, promoting environmental aesthetics, promoting decentralism, building future-oriented long-term perspectives, developing interest in non-material things, developing idea of interdependence, avoiding conflict between development and conservation may help in humanizing education.

13. The UN, UNDP, WHO, UNESCO can play crucial role in protecting the global environment and promoting sustainable development.
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15. Computer, Internet, Information Technology, Multimedia, Teaching aids and models, techniques of educational technology may help in advancement of knowledge related to environment.

16. The National Environmental Awareness Campaign (NEAC) may help to conduct various activities such as seminars/workshops, camps/rallies, competitions, festivals/street theatre/science fairs and for preparation of educational resource material on environmental issues etc. by NGOs, Voluntary Organizations, Educational Institutions, State Govt. Departments, Registered professional bodies etc. for creating environmental awareness. These proposals must include an action-oriented component, which would result in environmental improvement and benefit to the local community.

17. Concept map as an effective instructional strategy which can foster creative meaningful learning. The mapping process can help to identify key concepts and is a powerful method for assisting learning at the conceptual level to obtain objectives. It will also help to bring out quality improvement in the teaching-learning process.

18. It is further suggested that instructional techniques and new methodologies can be adopted in schools and colleges in improving students style of learning and thinking.
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19. The educationists and curriculum planners should adopt new methods of teaching for attaining aims and objectives of teaching. Problems of classrooms can be solved by applying new methods of teaching.

SUGGESTIONS FOR FURTHER STUDY

The present study was conducted with certain limitations. It is therefore, suggested that the further investigation in this direction may be taken up with the following suggestions:

1. Studies may be conducted by taking a large sample of students, teachers and teacher-educators.

2. This study was restricted to high school students only, the same study can be extended to college and University levels also.

3. The similar investigation can be extended to rural and urban schools also.

4. It is suggested that similar investigation may be extended to different age groups, which may reveal different results.

5. More factors may be studied, which may have impact on the environmental awareness of high school students.

6. The study was done only on students of Chandigarh schools. But it is highly desirable that if we want to bring a drastic change to save our perishing environment such studies should be conducted for all the high schools of different states at large scale.

7. Since the present study is limited only to high schools students only, it paves way for the investigators to conduct such studies by including engineering/medical colleges, professional colleges, industries and other institutions.

8. Studies can be conducted by taking other variables.
9. Further studies are necessary to identify optimal intervention strategies devised to foster in people a sense of personal responsibility and self-determination that may propel these into action.

10. The different factors which are influencing environmental perception and practice at different levels of education can be identified.

11. More researches are needed to incorporate the concept map and pathfinder network tools. Such investigations would include a pre to post-instruction comparison and assessments against expert referent structures.

12. Further research on the effectiveness, implementation and limitations of concept mapping is needed. Findings of this study suggest several refinements and potential directions of inquiry.

13. The instructional modules developed for this research have been validated and can be the basis for other instructional efforts and research. Individualized feedback on concept maps should be provided to help students to improve their mapping skills.

14. Qualitative case studies of a few students decisions and thought process about concept maps and/or clinical interviews with a larger sample should provide insight into the ways in which students construct and use concept maps.

15. An investigation with multivariate techniques can be done to study variables that are related to concept mapping.

16. In addition, concept mapping can be implemented in other ways besides having investigator teaches the environmental concepts, students can also make their own maps. The problems investigated in this research and many of those suggested in review of related literature also apply to alternate uses for concept mapping.
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17. Further research on the effectiveness, implementation and limitations of concept mapping is needed.

18. Different types of concept mapping such as hierarchical-propositional concept mapping, hierarchical concept mapping, and propositional concept mapping can be used with other variables.