

**AN INTERVENTION TO IMPROVE THE QUALITY  
OF INSTRUCTION IN ENVIRONMENTAL SCIENCE  
FOR PRIMARY LEVEL SCHOOL CHILDREN**



**Abstract**

Submitted to

The Maharaja Sayajirao University of Baroda

for the Degree of

**DOCTOR OF PHILOSOPHY**

**(EDUCATION)**

Guide:  
Prof. Sneha Joshi

Investigator:  
Archana Tomar

P/Th  
9005

**CENTRE OF ADVANCED STUDY IN EDUCATION**

Faculty of Education and Psychology

M.S. University of Baroda

Baroda-390002

December 1998

## **Abstract**

### **Introduction**

Today organisations are undergoing turbulence, as they are facing multiple challenges and threats to effectiveness, efficiency and profitability, increased competition and changing customer demands. Organisations need to develop to cope with the changes. For this, development; training, education and various interventions are required. These interventions would ultimately improve the quality of organisation by increasing productivity, maximising effectiveness and efficiency, maximising speed, maximising relevance and minimising psychological and organisational strain. Interventions are the vehicles for causing change.

School as an organisation operates at three levels -- Primary, Secondary and Higher Secondary. Although primary level is the foundation of entire school education, it continues to be a weaklink. There are problems like poor enrolment, low retention, high rate of wastage and stagnation, high teacher pupil ratio, poor infrastructural facilities, abysmally poor condition of schools, absenteeism among teachers may cloud the problem of curriculum load. The high rate of dropouts has its origin in the curriculum. It takes away the element of joy and inquiry from learning, irrelevant curriculum and uninteresting curriculum transaction in classroom that obviously contributes to the rate at which children leave school in the early years, undoubtedly, under the force of economic and social circumstances.

With the help of various interventions, it will be possible to fulfil the directive of Indian constitution (Article.45) "Free and Compulsory education for all children until they complete the age of fourteen years." Elementary education constitutes a very important part of the entire growth, development and enrichment of mental as well as physical potentialities of the child. Strength and progress of a country rest on the educational foundations of her people. Rightly organised primary education is the very first front and the most important one, from which our educationists should launch the attack, in order to solve the obstinate educational problem of the country. Intervention needs to be taken up at the primary level, in order to improve the quality of instruction. The improved quality of instruction will enable the learners to increase their level of academic achievement. Further, it would also help them to develop some higher cognitive abilities, metacognitive abilities related to affective domain. All these would help the system to reduce wastage and stagnation. Thus, the interventions would be useful at micro level (learners). If the process of instruction or curriculum transaction is improved, interest can be sustained.

There have been number of interventions done by government as various policy recommendations. The commissions and committees have emphasised measures to improve the quality of elementary education that includes reform in the content and process of education. So the emphasis will now shift from sheer enrolment to retention and quality of education. Education commission 1964-66 emphasised that each state should prepare a perspective plan to enrol all the children in the age group of 6-14 in order to fulfil

constitutional directive. Each district would be assisted by the necessary financial allocation. It recommended that all the children should get five years of education by 1975-76 and seven years of schooling by 1985-86. Draft Policy on Education 1979 mentioned highest priority to primary education. It recommended that education at this stage should be general and not specialised, and should give pupils a confident command of language and tools of scientific attitude. Curriculum load at the school level a quick appraisal (1983-85) focused on child centred approach and activity based process of learning. National Policy of Education (1986) emphasised that new thrust in elementary education will focus on three aspects (i) universal access and enrolment, (ii) universal retention of children upto 14 years of age, and a substantial improvement in the quality of education to enable all children to achieve minimum levels of learning (essential levels of learning). It also brought the scheme of Operation Blackboard. The purpose of Operation Blackboard was to ensure provision of minimum essential equipment. It envisages (i) two reasonably large rooms that can be used in all weather; (ii) necessary toys and games material; (iii) black boards; (iv) maps; (v) charts and (vi) other learning materials. National Policy of education (1992) gives unqualified priority to primary education, it planned a large and systematic non formal education programme combining flexibility with quality in order to reach them. School building are being made more attractive and incentive schemes like school lunches are being implemented. Decentralisation and district specific planning to develop educationally backward district was introduced. The District Primary Education Programme (DPEP) focused on development of district

specific plan by keeping in view the following parameters; (i) The emphasis on local area planning while formulating the district plans. (ii) Greater rigour and infusion of professional inputs in planning and appraisal. (iii) More focused targeting educationally backward districts with female literacy below national average and where Total Literacy Campaign has been successful. (iv) The coverage will be focused on primary stage with stress on girls and socially disadvantaged groups. DPEP has been taken up in the 44 districts in the states of Assam, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu. Today it covers 59 districts in 11 states and will extend to 120 districts in 13 states. It emphasises the disparities and equalisation of educational opportunity by attending to the specific needs of those who have been denied equality so far. DPEP is designed to improve quality of teaching and learning, increase retention and expand access. In Gujarat DPEP is functional in three districts Dang, Banaskantha and Panchmahal.

Primary Education in Gujarat is the state's responsibility. The primary schools are managed by Municipal Corporations, District Education Committees and Private trust. The schools belonging to first two categories are fully funded by Government. Whereas private schools are self financed. All the schools are inspected by the officials of state department of education.

The subjects taught at primary level are (Mother tongue) Language, Mathematics, Environmental science (Combination of Science and Social Studies), Art and Physical Education. Language is an important tool that increases self expression in day-to-day interactions. Mathematics develops logic

and reasoning that is helpful in day-to-day life activities. Art develops psychomotor skills along with appreciation and aesthetic sense development, whereas physical education helps towards healthy development of body. Environmental Science prepares well informed and responsible citizens. Environmental Science covers the content from the immediate environment of the children. The child is taught about the interdependence and interrelatedness amongst various living as well as non living things. Habits and values are inculcated in children at an early age, there is a saying catch them when they are young. This age suits the teaching of Environmental Science. It aims at developing an understanding of physical and social environment.

Environment has been defined as the sum total of all conditions and influences that affect the development and life of organism. (Ambasht 88). The conditions and influences can be biotic or abiotic that is living or non living. All living beings are directly or indirectly dependent on nature. So, it becomes a pre-requisite that, we should be aware about the extent to which homeostasis of nature works. Beyond equilibrium, there are back lashes, which certainly are undesirable. Our main goal is sustainable development. For sustainable development, we will have to train our young minds in their early years through environmental science. The objective of Environmental Science is to acquire awareness and knowledge, to develop attitudes, skills and abilities to participate in solving real life environmental problems. Study of Environmental Science is important for sustainable development. Whatever exists today on planet earth, has to be used very judiciously, so that it can also persist in future.

Environmental Science at the primary stage is a subject taught from class I to IV which lays a basic foundation for science and social environment. Whatever instances or incidences are taking place around us directly or indirectly influence child's growth and development. So, pupil must know about the environment. Students should be able to observe flora and fauna around them, should be able to recognise and protect them from being harmed or destroyed. They should be able to know about the importance of air, water and food as well as how to stop air, water and food from getting more polluted. They should be able to develop the habit of cleanliness. They should be able to see and observe the gradually expanding components of human life. Environmental Science has to be taught through the environment itself where environment is used as a material of teaching.

Looking at the present scenario of primary education, one finds that, though textbook based on minimum levels of learning has been implemented from class I to IV, teaching continues with teacher centred activity of reading textbook aloud with occasional noting of salient points on the black board. Even the subject of Environmental Science is taught orally without the support of Environment. It is necessary that the teaching at elementary stage is concrete. The students of primary school belong to the concrete operational stage according to Jean Piaget's theory. Thus there is a need to teach the children through concrete activities.

Hence there was a need to develop an instructional program in this subject through different methods, media and activities. Therefore the

investigator conducted a study where she developed and implemented instructional package for seven units of standard IV in the subject of Environmental Science. The purpose of the study was not to just bring improvement in results alone but also to achieve objectives related to affective domain and psychomotor skills.

#### **Review of Related Studies.**

The review made by the researcher of related research studies in India and abroad have brought out some facts in a clear manner.

- 1) Project interventions of different nature are must for improvement of quality of primary education in India and other Asian countries.
- 2) Project intervention and other experiments have improved learners achievement for different school subjects at primary level in different states of India.
- 3) Different teaching strategies making use of audio visual aids and group interactions have been useful for learners with regard to development of higher cognitive abilities, affect attributes and concept formation.
- 4) Last but not the least the teaching of Environmental Science through environmental approach and use of different instructional medias for transaction of curriculum has helped students for better understanding of the subject, improvement in academic achievement, development of interest, joy etc.,

In light of the findings, when the researcher studied the scenario of teaching of environmental science in Baroda, it was found that in absence of any innovative approach the academic achievement of learners at primary education

level was poor. Further, the affect attribute were also not found developed properly. All in all, it reflected on poor quality of primary education. Researcher, therefore decided to develop her own intervention programme making use of different instructional medias/ methods to teach unite of environmental science at fourth standard level.

#### **Statement of the problem**

'An intervention to improve the quality of Instruction in Environmental Science for Primary level School Children.'

#### **Objectives of the study:**

1. To prepare intervention programme for seven units in the subject of Environmental Science for standard IV in a school of Baroda city.
2. To implement the intervention programme to study its effectiveness on standard IV students in terms of their academic achievement in a school of Baroda city.
3. To study standard IV subject teacher's opinion about the intervention programme implemented by the investigator.
4. To study the opinion of the students of standard IV about the intervention programme.

#### **Operational Definition of the terms.**

**Intervention:** Any action on the part of an organism that serves to change the relative position of the objects or forces of the environment and of the organism itself, thus bringing new stimuli to bear upon the organism. In this study it

refers to the activity oriented instructional material that would change the relative position of pupil's achievement.

**Quality of Instruction:** Quality:- According to Random House Dictionary "A quality is a Characteristic innate or acquired which, in some particular, determines the nature and behaviour of a person or thing" For this study it has been defined as follows. The quality of instruction means a process of curriculum transaction through various strategies (that is using different methods and media), to enhance the attainment of pupils not only in cognitive abilities but also metacognitive abilities.

The quality instruction will enhance enquiry skills, psychomotor skills, active understanding and high participation in the process of teaching and learning.

The quality instruction would nurture personal responsibility among children, integrity, citizenship, human understanding and collaborative work amongst learners.

Thus, quality of instruction, would mean strategies to bring desirable changes in pupils behaviour.

**Environmental Science:** Environmental Science is an integrated process which deals with man's inter-relationship with his natural and man-made surroundings including the relation of population growth ,pollution, resource allocation and depletion, conservation technology and urban and rural planning of total human environment. Environment Science is a study of the factors influencing ecosystems, mental and physical health, living and working

conditions and population pressures. Environmental Science is intended to promote among citizens, the awareness and understanding of the environment, our relationship to it and the concern and responsible action necessary to assure our survival and to improve quality of life. In this study it refers to the syllabus that is the textbook taught at the lower primary level.

**Primary Level:** Primary level is a stage of education which comes before secondary level and after kindergarten. It includes students from grade I to grade VII. The Primary level is divided into two phases, lower primary and upper primary. From grade I to IV it is lower primary level, whereas from V to VII it is upper primary level.

**Delimitation's of the Study:**

1. The study was limited to one primary school of Baroda city.
2. For this study, only standard IV has been selected.
3. In standard IV, study was confined to only one subject that is Environmental Science and ten chapters of subject text book published by Gujarat State Textbook Board.

**Hypotheses of the study.**

In order to study the effectiveness of implemented intervention programme, eight null hypotheses were formulated. The null hypotheses for the present study are as follows.

1. There will be no difference in the mean achievement scores of the students in written, oral and activity test of unit I after receiving the instruction through the intervention programme.
2. There will be no difference in the mean achievement scores of the students in written, oral and activity test of unit II after receiving the instruction through the intervention programme.
3. There will be no difference in the mean achievement scores of the students in written, oral and activity test of unit III after receiving the instruction through the intervention programme.
4. There will be no difference in the mean achievement scores of the students in written, oral and activity test of unit IV after receiving the instruction through the intervention programme.
5. There will be no difference in the mean achievement scores of the students in written, oral and activity test of unit V after receiving the instruction through the intervention programme.
6. There will be no difference in the mean achievement scores of the students in written, oral and activity test of unit VI after receiving the instruction through the intervention programme.
7. There will be no difference in the mean achievement scores of the students in written, oral and activity test of unit VII after receiving the instruction through the intervention programme.

8. There will be no difference in the mean achievement scores of the students in written, oral and activity test of comprehensive examination after receiving the instruction through the intervention programme.

#### **Nature of the data required for the study**

Following types of data were required for this study. For the second objective in order to study effectiveness of the intervention programme, the data required was in the form of a post test score for all the units taught. For the third objective, the opinion of the teachers was required and for the fourth and the final objective opinion of the standard IV students was required.

#### **Sources of data :**

The data regarding the second objective was collected from the students, this was regarding the post test score, achieved after the implementation of the intervention programme. The data regarding third objective was collected from the teachers, regarding the intervention programme. Finally, for the fourth objective the data required was in the form of opinion of the students, regarding the intervention programme and it was collected was collected from the students. Thus, students and teachers constituted the sources of data collection.

#### **Design of the study**

A quasi experimental approach with single group pretest -- post-test design was adopted.

### **Sample of Study**

Population of the sample was comprising of all the students studying Environmental Science in class IV in a school of Baroda city and the teachers teaching Environmental Science in class IV in Baroda city . Sample of the study was taken randomly. It was an intervention study where the aim of the study was not just development of the package or implementation of the package, or just to see the effectiveness of the package but, the aim was to see the qualitative improvement in the achievement of the students. For this purpose, randomly a school consisting of large number of students from the lower socio economic background were taken. The teachers of this school were of the opinion that whatever efforts are done, the children will not improve. All the students of that particular class and their environmental science teachers were selected as the sample of the study. The design selected for the study was a single group pre-test post test design wherein the achievement was studied prior to the implementation of the intervention programme and after the implementation of the intervention programme.

### **Tools used in the study**

In order to measure the academic performance of students, achievement tests were prepared by the investigator. Two separate semi-structured interview schedules were prepared for teacher and students. The tools were developed by the investigator. These tools were finalised through validation by five expert in the field of education and language to judge the validity, reliability,

objectivity and feasibility of them. The tools were modified on the basis of the suggestions made by the experts.

### **Process of data collection**

The data was collected by the researcher with the help of different tools in phases. In the first phase of study, observations were done in standard IV of five schools for one week each to study teaching of Environmental Science. The schools for observation were selected randomly. During this time the researcher talked with the teachers and children to know the hard spots in environmental science. Having studied the current pattern in the first phase, in the second half of the first phase intervention programme was prepared keeping in view the hard spots mentioned by students and teachers, their importance in the textbook and relevance in upper primary classes. In all ten chapters were selected, they are as follows, living world, plants and animals, earth and sky, our directions, moon view, weather, soil, our food, forms of matter and forms of water. These chapters on the basis of their content were rearranged and categorised into seven units. The seven units are: Living - Non living, Plants and Animals, Earth and Sky, Weather, Soil, Our food and Matter. These units were logically arranged and sequenced wherever necessary some additional information was added. The whole programme was developed in the dialogue form where there were activities for students and researcher. The activities, charts, models, audio cassette, puppets and experiments were all of a low cost. The activities were small and simple. Each unit was followed by a test. The test were of three types namely written, oral and activity. Thus,

the intervention programme was developed. The draft of the intervention programme was then sent to five experts in the field of language, primary education and environment. Simultaneously information schedule to be filled by the students, interview schedule of students and teachers were prepared and validated. On the basis of experts suggestions the text was modified and was finalised.

In the second phase school was selected and pilot study was done. Selecting a school was difficult task as the children in many municipal corporation schools didnot know how to read and write in standard IV. Some schools were multigrade where students of more than one division sat together. There were schools where teacher pupil ratio was too low. One school Sharda Mandir Vidyalaya Baroda (Gujarat State) was selected for the study, where the teacher pupil ratio was 1:40. The students were belonging to low socio economic background, they could also read and write. The school was selected randomly. The teacher said "However hard we try these children show no improvement. If similar efforts were done in a private school where children come from better family background, we could have achieved better results" . After selecting the school pilot study was conducted. In the pilot study all the seven units were taught and tested for pilot study two months were taken. It brought some changes in the evaluation pattern . Long answers were converted to short answers . Number of activity sets were increased. It was found that the achievement of the pupils increased after the pilot study.

Finally intervention programme was implemented. Students family background was collected using information schedule. Pre-tests were conducted before teaching each unit. After having taught the unit post test was conducted. At the end of seven units the comprehensive test was conducted. The implementation took two and a half months. After the implementation of the intervention programme opinion of the students were collected with the help of semistructured interview schedule and finally the opinion of teachers were collected using semistructured interview schedule.

#### **Analysis of data :**

Analysis of data means studying the organised material in order to discover inherent facts. It refers to study data from as many angles as possible to explore the new facts. The data collected was analysed, objective wise, using appropriate techniques. The data was analysed both qualitatively and quantitatively. The second objective was to collect achievement of students, wherein achievement tests were administered and the scores obtained by the students were calculated. Effectiveness of the intervention programme was measured by using t- test of significance, wherein the difference between the pre-test scores and post-test scores was found and then mean was calculated. After calculating mean, standard deviation and standard error of mean was found, from it t-test was applied - first individually to written, oral, activity test and then to the total of the three. For the third objective, the opinion of teacher regarding the intervention programme was collected which was analysed qualitatively. Finally for the fourth objective interviews were conducted to know

students' opinion about the intervention programme. The data collected was analysed qualitatively.

**Major Finding of the Study:**

**1. Effectiveness of Intervention Programme.**

It was found that the difference between pre-test and post-test scores for all the units and all types of tests was significant. All the null hypothesis framed at the beginning of the study were rejected. This clearly indicates the overall effectiveness of intervention programme. The probable reasons for this could be scope of creativity, independence, more interaction between researcher and students, activity oriented teaching, use of different methods and medias by the researcher for implementing the intervention programme. All these led to more active participation and involvement of students in classroom instructional process which was not there earlier. The implementation of programme was successful in arousing the level of interest, curiosity and various types of inquiries on part of students. Learning through intervention programme also enabled the students to get acquainted with self learning process. This also developed analytical abilities among them. Thus, on the whole the intervention programme helped the learner not only to improve upon their previous academic performance, but also helped them to develop higher cognitive abilities, metacognitive abilities, psychomotor skills and some aspects related to affective domain. All these ultimately help students for their all round development. If there is change in the infrastructural facilities, school ecology is good and if the facilities provided at the school level are good and utilized properly the

achievement of the students was found it improve. ( Dave 1988, Bhattacharya 1991, Govinda and Verghese 1991 and Gupta and Gupta 1992.) . It was found that if environment was taught with environmental approach the achievement of students have improved. (Joshi 1981, Deopuria 1984, Kaushal 1997, Lalitha 1997, Mahopatra 1997).

### **2. Opinion of the Students:**

All the students favoured learning through such intervention programme as it makes use of different teaching strategies which does not lead to monotony of one single method of teaching. Combination of different methods has helped them to feel interested in learning. The methods they liked the most were role playing, team teaching, puppet and story telling as these were the methods through which learning was enjoyable experience and they felt involved. Regarding medias for learning, they opined that learning through video and tape recorder was most effective for them as they were audio visual aids. Further they also liked learning through charts and models. Regarding evaluation pattern adopted by the researcher they liked the activity type test most where they had a scope to exhibit their creativity and psychomotor skills. The most important thing that they mentioned was that they would also like to learn other subjects through intervention programme.

### **3. Opinion of the Teachers:**

The teachers opined that the intervention programme, on the whole, was effective in terms of the achievement of students and improvement in frequency and quality of interaction with the teachers. It has helped them in self learning

and has also enabled them to involve themselves in learning process with lot more interest and curiosity.

Regarding the quality of intervention programme, the teachers expressed happiness over the comprehensiveness in covering the content matter and for the language used for instruction. The combination of different methods and medias used for clarifying important concepts of the subject was also liked by them. All this helped to improve academic achievement of the students.

Regarding the change in students' classroom behaviour, the teachers admitted that they could see significant changes in students' behaviour with regard to their involvement in the classroom instructional process as they became more active, dynamic, curious and interesting lot of learners. Thus the package has not only helped students but even teachers opinion has become more positive.

#### **Implications of the Study.**

The present study was conducted in the primary school for the subject of environmental science in a school of Baroda city, wherein majority of students population belonged to lower economic and social background. The purpose for carrying out this study was to develop and evaluate the effectiveness of intervention programme through its implementation. Although researcher came across many studies in the area of primary education most of the studies were either survey or correlation in nature. But these studies have not helped to improve quality of classroom instructional process. Even if there were some experimental studies, there was hardly any study in the subject of Environmental

Science. Researcher was not interested merely in conducting an experimental study in this subject but she was interested in carrying out a study in actual classroom setting without having control and experimental groups. Therefore, keeping in mind this, the researcher has undertaken intervention study in this subject, where researcher made use of combination of various methods and media's and strategies for classroom instruction. The intervention programme was developed for seven units and was implemented in the standard IV classroom for sixty periods. The data collected was analysed and interpreted with the help of appropriate techniques which has been discussed in the previous chapter. In the earlier portion of this chapter, major findings have been discussed. But when this type of study is conducted it is very important to mention about implications of findings as they have far reaching impact in improving quality of teaching learning process. Some of the educational implications are enlisted here.

Primary education is a foundation for development of every individual and therefore the equality of teaching learning had to be taken care of at this stage. The finding of this study shows that in majority of actual classroom situations, we hardly practise any other method other than lecture method. This leads to a situation where whole instructional process becomes one-way and students are not actively involved even the teacher also felt that the situation cannot be improved. Especially in a school majority of students from lower economic strata. But the findings of this study clearly indicate that the family background of students is not at all a barrier for implementing the various types of teaching

strategies, methods and media's to improve the academic performance. And bringing positive changes in the behaviour of students. Such type of intervention programme has helped the students, in present study, to improve their academic achievement and enhance their interest and curiosity. This clearly shows that this type of intervention programmes can help the students to achieve the objectives not only related to lower level of cognitive abilities but even higher abilities; related to metacognitive, psychomotor skills as well as abilities related to metacognitive and affective domain. Because, such programme helps students in self-learning independent thinking and arousing curiosity amongst them. Thus, it is necessary to see that such programme should be developed in the same subject for other units as well as in other subjects also. So that we can achieve desired improvement in quality of teaching learning process moreover developing and implementing such programmes provides ample scope for creativity and innovativeness of the teacher. Management of school also should motivate such innovative practises on a large scale so that slowly and gradually a day would come when such programmes become inseparable part of classroom instructional process and we will not only be achieving the goal of "Education For All" but "Better education for all".

#### **Suggestions for Future Studies.**

1. A similar type of intervention programme needs to be developed and implemented for those units of Environmental Science which were not covered in the present study.

2. Similar type of study can be conducted by developing and implementing intervention programme for other subjects like Mathematics and Languages.
3. The similar type of programme developed can be tried out in a school in rural area.
4. A training programme could be developed for training teachers to prepare and implement such intervention programmes.
5. Similar programmes can be developed at different levels to bring environmental awareness and sensitivity among people. Such a programme at secondary, higher secondary, university or adult education level can bring sensitivity towards environmental problems.

**Conclusion:**

The students of standard IV find the Intervention Programme in the subject of Environmental Science more interesting and joyful. As the intervention programme was found effective in improving the achievement of the children, it could be used for developing sensitivity towards environment. It could also be used to train teachers for developing and implementing such program for different standards in different subjects. Such a programme could be developed for secondary, higher secondary, university, adult education and non formal education level. It assumes more importance as recently central government has announced compulsory environmental science course at all levels.