Abstract

The main causes for the failure of achieving the goals of science teaching lies in the content and methods of teaching employed in the classrooms. A need was felt to have some innovative method of teaching science so as to overcome from the drawbacks of the traditional methods of teaching. One such method is Cooperative learning method. Cooperative learning may be defined as a classroom learning environment in which students work together in small mixed ability heterogeneous groups on academic tasks. In cooperative learning each student serves as a major learning resource for each other, sharing and gathering information needed. Enjoyment and interests are the positive outcomes of this strategy. It also fosters the higher level of motivation and more interpersonal relationships, helps children to assume responsible adult roles and act on the environment relatively, reduce anxiety and ethnic tensions and increase self-esteem among the students, provide solutions for the problems created due to excessive competition, large classes, short supply of learning materials and in multigrade teaching context, in mainstreaming handicapped students and in dealing the students of different intellectual levels, caste, socio-economic status etc.

1 Introduction

Science has become one of the human activities that man has created to gratify certain needs and desires. The advancements that are taking place in medicine, astronomy, agriculture, engineering, oceanography, aeronautics, space travel, microbiology, nuclear biology and innumerable other branches and sub-branches of scientific study are marvellous. Science has improved the conditions and quality of living. Hence, there is a need for every secondary school pupil to study general science
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as a compulsory subject, so that they gain a basic quantum of scientific knowledge as a part of their general education. Some major science teaching goals at secondary stage include helping students to become scientifically knowledgeable and competent to deal with scientific issues, recognize the relevance of science to everyday living and to societal issues, communicate effectively with others about science, enjoy studying science, and finally become self-motivated lifelong learners. In such an age of scientific advancement, it has become very essential for each and every individual to have some knowledge of science for making effective and useful contribution to life.

2 Causes for the Failure of Achieving the Objectives of Teaching Science

Though several reform efforts now taking place to improve the quality of teaching of science, still science teaching is not up to the satisfaction and is suffering from a number of difficulties and defects. The main causes for the failure of achieving the objectives of teaching science lies in the content and methods employed in the science classrooms. Content is introduced to the children in big volumes. The methods of teaching followed in present day Indian schools are mostly mechanical and stereotyped. Students are given theoretical knowledge only. Science teaching has been and is still oral in character with demonstration occasionally thrown in. There is very little practical work. At the secondary and higher stage, a prescribed list of experiments is rigidly followed by the teachers in the laboratory, which is mostly in the nature of verifying knowledge, or working according to the set of rules, made quite explicit before introducing the real experiment to the students. Students are deprived of learning science in a lively, meaningful and joyful manner. Scientific knowledge is imagined, taught, learnt and gained as infallible by teachers and students. It is statutorily overfed and under examined. The method employed in day to day teaching is highly routinized. Through the word of mouth, a load of facts, little related as well as meaningful or which are too difficult to grasp by young children is presented. The entire uninteresting long lump of content is interspersed by a list of pointless experiments rarely conducted in close association with theoretical constructs. The children are little introduced to the real nature and spirit of scientific enterprise. Teaching of science does not go beyond the text books, does not go to environment and does not touch the heart of the children. For far too long, science education had the task of preparing stereotyped functions i.e., for a particular trade or a given job. It inculcated conventional knowledge; a set of intellectual and technical equipment valid for a life time is out of date. Now the fundamental axiom of traditional education is crumbling. Modern science education emphasizing learning to live, learning to learn, so as to be able to absorb new knowledge all through life, learning to think freely and critically, learning to live the world and make it more human, learning to develop in and through creative work. Hence, it is the sole responsibility of the people of science education, especially science teachers, to think of new objective based curriculum and new methods and techniques of teaching which help the classroom teacher to achieve the objectives of teaching science.

3 Drawbacks in the Present Day Science Teaching Methods

The most common methods of teaching science in present day schools are lecture and lecture-cum-demonstration method. Both these methods stressed only on telling, memorizing and recalling information. These methods reduce the achievement of students, does not help in enhancing social relationships, curb pupils' interest to investigate, decline the spirit of inquiry, lead to unhealthy competitive spirit. In such classrooms, students feel bored, disinterested and unhappy. These methods also develop negative attitude towards the class/subject/lesson as these methods encourage
competitive learning. They do not provide any scope and provision to direct children's impulsive and innate powers into systematic habit patterns of controlled inquiry of scientific methods i.e., learning to search effectively including learning to identify a problem, formulate hypothesis, gather data, analyze and evaluate evidence and draw vital conclusions to gain knowledge. Now the curriculum and method of teaching have continued to be organized to transmit information in the form of specific facts, concepts and generalizations. The activity of the learner in these methods has been directed toward 'acquiring or absorbing' and learning has generally continued to be conceived as transmission or absorption process. On the same argument, recently much has been written in criticism of conventional method of teaching science. Researchers have used a variety of terms to describe the traditional mode, 'passive learning-transmission teaching' (Caree, 1981), 'formal didactic exposition of factual knowledge' (Rawson, Taylor, and Brighoure, 1986), 'transfer theory' (Fox, 1983) and 'explain-practice' and 'direct instruction' (Wheatley, 1991). Although the terminology differs, the basic approach to these methods of teaching is the same. It characterized the belief that knowledge is a commodity which can be transferred by the act of teaching from one container to another. Though other methods of teaching like project, discovery, heuristic etc., help children in developing scientific attitude and skills in addition to acquiring knowledge, they pre-suppose smaller classes which are impossible to afford at least for a country like India. They also require well equipped laboratory and other facilities and well qualified personnel which are very difficult to afford and supply. Hence, in the present Indian context, they are not found suitable in teaching science in secondary schools. Hence, there is a need to find out an alternative teaching-learning strategy which would help classroom science teacher to achieve the objectives effectively. One of the better ways to teach science scientifically is to encourage children to identify significant questions and problems in science and work together for the solution. Much of this work can take the form of cooperative investigation in which pupils and teacher work together to clarify questions and solve problems. By this they learn that science is a cooperative venture and in order to obtain answer to their questions they have to depend on the work of others. Meanwhile, working together also help them in realizing the democratic values of society in addition to helping children to use the work of others for processing the information and to build concepts covering the world in which they live. Hence, wide variety of activities should be planned in order to adequately take into account the differences among the individuals. Since, interest and needs are inextricably tied up with the children's day to day experiences, it is important that activities have both meaning and significance to them if they are to achieve the goals that are sought through problem and developmental tasks. When activities are related to the life experiences of children, it is more likely that the learning will have greater application to daily living. One of the important ways which is explored through several studies is the use of cooperative learning techniques.

4 Cooperative Learning

Cooperative learning may be defined as a classroom learning environment in which students work together in small mixed ability heterogeneous groups on academic tasks. Cooperative learning is viewed as a means for improving student achievement and other cognitive skills (Slavin, 1984; Parker, 1985; Brophy, 1986). In cooperative learning each student serves as a major learning resource for each other, sharing and gathering information needed. Enjoyment and interests are the positive outcomes of this strategy. It fosters the higher level of motivation and more interpersonal relationships, helps children to assume responsible adult roles and act on the environment relatively.
reduce anxiety and ethnic tensions and increase self-esteem among the students. It also enhances the higher level of motivation. In cooperative learning environment, always there is a positive interdependence, students assist one another, share ideas and resources. It provides much freedom to talk aloud and explore thoughts and ideas with one another. Cooperative learning strategy also reduces alienation and loneliness. In such classes, students enjoy learning, like the teacher, class and school better, and show interest in subject matter.

Realizing the merits of cooperative learning techniques, there is a need to strongly advocate them in the present day science teaching in order to overcome from the drawbacks of traditional methods. Cooperative learning techniques also provide solutions for the problems created due to excessive competition, large classes, short supply of learning materials and in multigrade teaching context, in mainstreaming handicapped students and in dealing the students of different intellectual levels, caste, socio-economic status etc.

### 5 Need of Cooperatives Learning in Indian Classrooms

In the present era of science and technology, though emphasis is laid more on improvement of science education at different levels of schools and colleges, yet, majority of teachers are facing problems and difficulties, and undergoing failure in achieving the objectives of science teaching in secondary schools. Defective content, ineffective method of teaching, lack of buildings, equipment's, library and laboratory facilities, training of the teachers in using different kinds of audio-visual aids, knowledge regarding the usage of natural resources in teaching science are some of the factors which are forcing the teachers not to be able to teach science effectively in their classrooms.

In most of the Indian science classrooms, majority of teachers use traditional methods of teaching i.e., either lecture or lecture-cum-demonstration method. In these classes more importance is given for the content or the subject matter and its dissemination to the pupil rather than catering to his needs and interests. In these classes teacher occupies a prominent place and students are regarded as just passive recipients of knowledge and there is no provision for the students to learn by involving themselves in various kinds of learning activities. The participation of students is very much restricted to only asking and answering questions on what teacher has taught. Students internalize the concepts and principles of science only by listening teacher's teaching without being interacted with anybody. This kind of learning neither helps them neither in enriching their knowledge nor in their understanding. There are no opportunities for the students to explore, discuss, share and exchange their ideas with their friends or classmates. In these classrooms, the interactions of the teacher with the students are also minimum. As most of the Indian classrooms have large classes and are overcrowded, it is very difficult for the teacher to attend to the needs of each student separately. As a result, most of their questions and doubts remain unqualified. In some of the classes, the teachers sometimes use teaching aids or demonstrate experiments without involving each and every student. Because of this all students get no chance to have the direct experience of performing the experiment themselves. They only get chance to observe what teacher does in the class. There is no provision for any type of practical work where students can manipulate their intelligence and capability to find out a new thing for themselves. Thus, pupils’ interest to investigate is curbed and spirit of inquiry is decreased. Children tend to be naturally creative, but their creativity is dampened as a result of authoritarian system of teaching. In our lecture-oriented teaching of science, there is no provision for the activities where children would apply their process skills like observation, generalization, interpretation of tables/diagrams, prediction etc. Mostly these methods encourage students to learn the
concepts, principles and generalizations of science competitively rather than through cooperation. As a result, only bright students make grade, and average and below average students remain backward. Thus, the gap between bright, average and dull students is widened.

In the schools where classes are coeducational, students of opposite sex sit separately in rows. This does not help students to have positive social relationships with the students of opposite sex and widens the gap between them. In many science classrooms, students of the same caste, socio-economic status background and ability sit together in the same bench and learn. This also develops a wide gap between the students of different castes, socio-economic status and ability levels, and increases competitive spirit among them. It hinders in development of positive social skills among them which are very much essential to realize the democratic values of our society.

6 Conclusion

Having considered all the drawbacks of traditional method of teaching science, there is an urgent need to find out an alternative teaching-learning strategy where students of different castes, intellectual levels, sex, and socio-economic status sit together and learn, and problem of teaching science in large classroom with limited facilities could be solved. The suitable method which is explored through several studies is the use of cooperative learning technique which helps the classroom teacher to overcome some of the above mentioned problems and develop both cognitive and social skills among the students.

References