Chapter I
Introduction

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In the contemporary world of science and technology, it is education that determines the level of prosperity, welfare and security of the people. The quality and number of persons coming out of our school and college determine our success in the great enterprises of national reconstruction, the principle of which is to raise the standard of living of our people.

In the modern time, the predominant aim of education is to enable a citizen to develop scientific attitude to think objectively and base one’s conclusions on tested data. Development of scientific attitude empowers an individual with the understanding and intellectual integrity to sift truth from falsehood, facts from propaganda and to reject the menacing appeal of fanaticism and prejudices.

The 21st century is witnessing rapid growth in the area of information and human development. One of the great challenges faced by the new century is adapting educational needs of the society. As explosion of knowledge is very fast today, it is very urgent to teach immediate steps to make education more useful. (Bear, 1993).

True education is that which draws out and stimulates the spiritual, intellectual and physical faculties of the children. Implicit in this aim is the belief that education has the potential to transform individuals and societies. Education is very important for an individual's success in life as it promotes individual’s skills that prepare the students physically, mentally and socially for the world of work in later life. Educated individuals enjoy respect among their colleagues and they can
effectively contribute to the development of their country and society by inventing new devices and discovering things. Educational development prepares youngsters for adulthood so that they may form the next generation of leaders. It can yield strong families and tenacious communities. Another essential task of education is to enable people to understand themselves. Students must be equipped with knowledge and skills which are needed to participate effectively as member of society and contribute towards the development of shared values and common identity and to understand their cultural identity.

Science education plays a crucial and pivotal role in the alchemy of scientific research and technological innovations, which overlap with every aspects of human life, in family, society and world as a whole. In a progressive forward looking society, science has the potential to liberate people from poverty, ignorance, and superstition.

Importance of science lies in creating an enlightened citizenship and in training our citizens to understand the scientific world in which we live as well as in preparing them to be able to pass the frontiers of knowledge necessary for adding new. In science education, we find a common call for the need for deeper, more conceptually rooted knowledge that students can relate and apply to real world problems.(Braud and Reiss,2006; Blute, Westbroek, de Jong and Pilot,2006; cited in NRC, 2012). Secondary science education often results in the development of what (Whitehead, 1967) called ‘inert knowledge ‘information that is de-contextualised from the real world. Contextualised information helps the students to find the
interconnection between knowledge and its application in real life situations outside school.

To cope with the fast-changing world, the most important skills are open mind in accepting the knowledge without bias, flexibility in adapting to new demands and creativity in taking advantage of new opportunities, self awareness to accept the changes, problem solving skills for smooth functioning of society, ability to make decisions for the well being. These imperatives have to be kept in mind in shaping science education.

The instructional materials developed by the NCERT under UNICEF aided project, during 1967-70 was based on activity-based approach in to the teaching of science. The package of instructional materials comprising syllabus, textbooks (titled Science is Doing ), handbook of activities, teachers’ guides, science kit and audio-visual materials were developed through a process of trial in a limited number of schools. The instructional package developed for the middle schools, Classes VI to VIII, too comprised similar components and was also developed through field trials. (NCF,2007). The gap perceived between recommendations of various commissions and committees and actual practice motivated several individuals and voluntary organisations to take up innovative programmes in teaching of Science at schools.

Zaragoza the then, Director General of (UNESCO,2000) stated that “Never before until now, has the tension between science and the human conscience, between technology and ethics, reached a point where it has become a threat to the world as a whole. We are so dazzled that we do not perceive the threats hanging
over our heads, warning us of the pressing need for a radically new and universally ethical outlook on the future of present day science”.

Science education should enable the learners for the application of their knowledge to real life situation. Science learning helps the enhancement of cognitive, affective and psycho motor development of an individual. To summarize, science education should enable the learner to contribute to the development of the society as a social enterprise. It is the duty of science teachers to empower the learners to scientifically approach the local and global issues at the interface of science and society and inculcate values of honesty, integrity, natural curiosity along with freedom from fear and prejudice.

Teaching strategies play a significant role in enhancing the learning abilities of students. In the words of (Gillepsie,2002), many of the goals of Science Education will be realized once teachers orient their teaching towards understanding of concepts. The New Educational Policy (NEP, 1986: Ministry of HRD ,1993) stressed the need for relating science in everyday life. It is therefore important that teachers should be encouraged to adopt methods that contribute to the meaningful attainment of concepts.

It is the duty of educational planners to accept the change in knowledge and develop content that inculcates the spirit of science in every student, in the background of knowledge explosion. Since each individual is unique, it is the duty of teachers to cater and the individual differences within the classroom to keep the students in pace with the expanding knowledge. Science learning helps the students
to apply scientific concepts, principles and attitudes not only in laboratory, but also in their wider life such as family, their community and their nation as a social being.

Science teaching and learning has a long history. We are concerned about the problems like global warming, carbon footprint, scarcity of environmental resources, etc. from the initial stage itself. These problems had been here decades ago, but still they remain unsolved. Biology is related with every aspect of life, and the biology teaching of Biology deals with health and hygiene, treating disease, proper nutrition, exercise science, understanding environment, conservation of environment, using natural resources, harvesting food and its storage etc. All these problems increase every day. This is because of the gap between the classroom learning and its practice in the real world. Scientific concepts selected in the curriculum should make sense of everyday experiences. It is important to ensure that a majority of activities and experiments which teachers initiate can be done using readily available inexpensive materials that can be practical in all schools, including those with inadequate infrastructure.

The developmental progress of a country depends on the extent to which it can utilize such knowledge and make new discoveries and inventions based on science learning. Similarly the success of any science classroom also depends what strategy teacher adopts and how much scientific enriched and resourceful the teacher is.
1.1 Curriculum and Contextual Teaching Learning- The Present Scenario

Everyday contexts are the situations children encounter through their interactions and activities everyday in their home and community. So as children play and interact with others, they develop concepts. These might be related to cooking, eating, going to clinic, sickness, starting school, or going on holidays, and so on. In other words, through their interaction children learn the concept relating to their lives. Here, in the context of real life experience, we see children exploring complex everyday concepts through their interaction with peers and with adults.

Apart from simple experiments and hands on experiences, an important pedagogic practice at this stage is to engage the students (in groups) in meaningful investigations -particularly of the problems they perceive to be significant and important. This may be done through discussions in the class with the teacher, peer interactions, gathering information from newspapers, talking to knowledgeable persons in the neighbourhood, collecting data from easily available sources and carrying out simple investigations in the design of which the students have a major role to play. Organizing information and displaying it in the classroom, in the school or in the neighbourhood, or through skits and plays are important parts of the pedagogy to ensure larger participation and sharing of learning outcomes. Biographical narration of Scientists and inventors are a useful practice to inspire students at this stage. The emphasis should be given to the learners to carry out learning even beyond the school.
There are three factors involved in learner are, the learner (child), the environment - physical, biological and social (life) in which the learner is embedded, and the object of learning (science). Since science education is dependent on context, it is important that research to be carried out in our own environment. (NCERT, 2006).

1.2. Instructional strategies

Multi-dimensional responsibilities of modern teacher demands the changing role of a teacher as co learner and initiate to design learning outcomes in pace with student’s needs and aspirations. In these days of rapid scientific and technological advancements, of teaching learning transactions and have become more sensitive and sophisticated. Consequently teachers are facing many problems to undertake the complex classroom activities effectively and successfully. At this juncture, the teacher ought to be motivated to strengthen and retain her zeal and enthusiasm towards teaching profession.

A significant influence on teachers’ instructional approaches in teaching is the theoretical perspective on learning. Social constructivist theory suggests that learning takes place through active participation and interaction between the teacher and the student. (Rogoff,1990, Mathew, &White,1996; Schunk, 2001;Schunk & Zimmerman,2007). Scaffolding or providing supports guarantee successful learning; learning and arranging collaborative experience to facilitate the construction of knowledge are the new role ascribed to the teacher by paradigm shift from Behaviourism to Constructivism.