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ISSN (Online): 2455-7838

SJIF Impact Factor (2016): 4.144

EPRA International Journal of

Research & Development (IJRD)

Monthly Peer Reviewed & Indexed
International Online Journal

Volume:1, Issue:10,December 2016



Published By :
EPRA Journals

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DIDACTIC IMPLICATIONS OF SCIENCE CURRICULUM AND ITS EFFICACY ON INCULCATION OF VALUES

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ABSTRACT

Science is not just a discipline of knowledge but a way of life. Apart from numerous specificity of science as a body of knowledge and a dynamic process of investigations, explanations and predictions, it is a system of human endeavours that helps us in training our body and mind, the way we think, the way we behave or interact with others in society and the way we form our belief system. The commonly perceived role of science education actually extends its boundaries for imparting such values to the learners that are the most essential ingredients of life. However, it is possible only when there would be an articulated perspective regarding how science teaching and its laboratory activities can help students imbibing those values. Science education is an integral component of school education system across the globe. In India, various educational committees and commissions like NPE, NCTE, IASE and CTE, have made continuous efforts to formulate strategies and subsequently monitor the quality of science education and have come up with a number of recommendations for the betterment of the classroom processes. This paper focuses on science education to elaborate its importance in instilling various values in students, specifically through laboratory activities. The paper emphasizes on the fact that science laboratory plays a very important role in articulating scientific concepts and helps in inculcating various values along with developing practical skills in students.

KEY WORDS: Science Education, Value Incultation, Education through Science

INTRODUCTION

It is generally said that the schools are the place where destiny of a nation is shaped. And going by this postulate, the academic disciplines and the teachers are obviously the architects of the destiny of a nation. It is a widely accepted fact that one of the main aims of school education should be to inculcate in children such values and attitudes that will enrich their own lives, and enable them, as thoughtful and sensitive citizens, to contribute to the development and advancement of society. The main problem with value education is therefore not its justification, but rather how to situate it in the school curriculum

framework and how to transact it in the classroom. Generally it is seen that any school curriculum doesn't have a specific compartmentalized and exclusive course outline for imparting values in schools. Rather, it is assumed to be imparted through various activities, morning assembly sessions, or through a few talks or lecture series. Whereas it must be understood by one and all that with an effective and articulated instructional strategy, value education could be imparted successfully through teaching of all main subject areas of school curriculum.

Science, being one of the most important curricular components of educational processes, is a discipline comprising knowledge, skills, scientific attitudes and noble values. The integration of these elements is very critical and important in ensuring a quality science education for the students who we wish to see in future competing with the contemporary global talents all over the world. As a discipline of knowledge, science provides a conceptual framework that enables students to understand the world around them. As a nation that is progressing towards gaining the status of a developed economy and a major stakeholder of the today's world affairs, India needs to create a society that is scientifically oriented, progressive, knowledgeable, having a high capacity for change, forward looking, innovative and a contributor to scientific and technological developments in the future. This society should also have the capability to manage the environment and its resources in a responsible manner. In line with this, there is a need to produce citizens who are creative, critical, inquisitive, open-minded and competent in science and technology.

The procedural specificity of science teaching manifests at three levels - the **fact** level, the **concepts-process** level, and the **values** level. We are living in the age of new realities and we need a new direction towards teaching and learning of science. We need to understand various social problems and try to develop solution using knowledge of science. A child affects his environment and at the same time is affected by it. A teacher's classroom behavior can have a dramatic effect on the value education of his students. We must provide an open classroom environment where the student can explore his value system concerning the social implications of selected scientific questions. The questioning behavior of the teacher is also an important fact in value education. Questions asked must not be just to test their knowledge. The questions have to be for testing the values developed after understanding and learning a concept. In India, 'Value Education' is stressed in the educational system with due concerns for it and its aims and objectives are reflected in the reports of different National Level Commissions and committees.

OBJECTIVES OF TEACHING VALUES

The objectives, outlined by various commissions and committees, in teaching values are: (a) to provide a realistic and broad-based understanding of human values and to educate/train students to become responsible citizens in their personal and social lives; (b) to develop and promote among students, values such as truth, humility, honesty, perseverance, cooperation, love, compassion, peace, non-violence, courage, equality, duty, morality, kindness, piety and righteousness, dignity of labour,

concern for others and a small family norm; (c) to enable students to understand, appreciate, uphold, protect and promote the sovereignty, unity and integrity of India and the national goals of egalitarianism, socialism secularism and democracy besides imbibing values enshrined in the Indian Constitution; (d) to protect, preserve and conserve the natural and cultural environment and to make judicious use of natural resources; (e) to develop scientific temper and spirit of scientific inquiry and capacity for independent and original thinking; (f) to understand, appreciate, promote and use knowledge of Science and Technology for enhancing productivity and human happiness; (g) to safeguard public property, remove social barriers and renounce the practice of violence, cheating, corruption and destructive tendencies; (h) to sharpen the intellect, build character and self-discipline essential for creative pursuits in science and technology; (i) to offer science education conducive to the development of physical, intellectual, moral, social, spiritual and economic aspects of life; and (j) to enable students to distinguish between good and bad, right and wrong and acquire intellectual wisdom and disposition to do what is ethically correct and good.

SCIENCE EDUCATION

Science is one of the most important disciplines of various studies prevalent in our society. It enables learners to understand what happens around them. As scientific concepts are generally related to or based on the phenomenon taking place around us, it proves as a difficult subject for many students. Science curricula commonly incorporate many abstract concepts, which are central to further learning in both science and other related areas. It is a well known fact that science is an experimental science which provides familiarity with the scientific method and in turn means doing something, observing, measuring and describing. It also provides an opportunity to the teacher to teach science as a way of investigation. Laboratory work is an essential component of science curriculum. Students can be stuffed with facts and theories but without experiments they cannot experience the reality of science as a science. The development of powers of observation, measurement, prediction, interpretation and decision making are dependent on laboratory work experience of students. But unfortunately at present it is believed that the study of science means abstract thinking, writing long formulae and complex structures and handling complicated equipments. The main reason for this belief is that the experiments which form a part of the syllabus are not relevant or interesting and are not related to the issues connected with the real life situations. Besides this, there are various constraints such as large teacher-pupil ratio in the class / laboratory, lack of physical

facilities for performing experiments as required by the rigid and time-bound heavy syllabus.

The Meaning of Science Education:-

Undoubtedly, education is considered as, and in fact it is, the vehicle of value inculcation. It would be interesting to have an analytical discussion on whether the essence of science education is 'science

through education', or 'education through science'. In other words, does it need to be considered as a component of science as a body of knowledge, or as a component of education? The following table gives a comparison illustrating the differences in emphases between 'science through education' and 'education through science':

Science through Education	Education through Science
<ul style="list-style-type: none"> • Learn fundamental science knowledge, concepts, theories and laws. • Undertake the processes of science through inquiry learning. • Gain an appreciation of the nature of science. • Undertake practical work and appreciate the work of scientists. • Develop positive attitudes towards science and scientists. • Acquire communicative skills related to oral, written and symbolic/tabular/ graphical formats. • Undertake decision making in tackling scientific issues. • Apply the uses of science to society and appreciate ethical issues faced by scientists. 	<ul style="list-style-type: none"> • Learn the science knowledge and concepts important for understanding and appreciating socio-scientific issues within society. • Undertake investigatory scientific problem solving to better understand the science background related to socio-scientific issues within society. • Gain an appreciation of the nature of science. • Develop personal skills related to creativity, initiative, safe working, etc. • Develop positive attitudes towards science as a major component in the develop of society and scientific endeavors. • Acquire communicative skills related to oral, written and symbolic/tabular/ graphical formats. • Undertake socio-scientific decision making related to issues arising from the society. • Develop social values related to becoming a responsible citizen and undertaking science-related careers.

Education through Science:-

It is clear from the above analysis that the term 'education through science' stresses education. And the medium through which this education takes place is the subject of science. Science education is thus no more about learning the ways of the chemist any more than history is taught to become historians, or language is taught to become linguists. Science in school is part of the total education provision and the science content is gained so as to enhance learning in the cognitive, personal and social domains. In fact a Science Laboratory is the testing ground for the concept formation pertaining to science and inculcation of values and skills in students.

Science Curriculum and Inculcation of Values:-

An effective science laboratory curriculum, as an integral part of science discipline, helps in imparting following values in the students:

1. **Intellectual Values:** Experimenting in Science is a method of acquiring knowledge. Scientific knowledge helps to sharpen our intellect and promotes honesty. The science education including science develops positive attitudes like open reasoning etc.

2. **Vocational Values:** In the present age we do not find any vocation that does not need the knowledge of science, moreover there are a huge number of vocations for which study science is a primary requirement, e.g. medicines, engineering, agriculture, computers etc.
3. **Aesthetic Value:** Knowledge of science in particular and science in general develops in man a passion for truth and thus he has a vision for beauty. The English poet Keats has said, "Truth is Beauty". Science is specially unfolding of the mysteries of nature and nature is the store house of all the things. Thus we find that teaching of science is essential for developing and sense in an individual.
4. **Practical Value:** Scientific principles and laws find a large number of applications in our every Life. For proper utility of such applications some knowledge of science is necessary. Even a casual look around us shows a lot of applications of science. For example electricity, electronics, communication, transport etc.
5. **Moral Value:** Knowledge of science develops in untruthfulness and reasoning. Though such qualities may not make us a successful

businessman or a successful politician according to present standards, yet these are the very qualities which are desirable in all human beings.

6. **Psychological Value:** Teaching of science and other sciences is essential for developing scientific attitude and scientific temper. Science helps us to develop positive attitude such as open mindedness, reasoning etc. The learning of science is based on the fundamental principles of psychology i.e. 'learning by doing', 'learning by observation', etc.
7. **Adjustment in Modern Life:** Science develops in us a scientific attitude. It also develops in an individual a specific procedure for attacking any problem. Such a specific procedure is called scientific method. Such a method prepares an individual to face the problems of life boldly and to solve them successfully.

CONCLUSION

The importance of science teaching in general and as an important instrument of value inculcation in particular, can be comprehended in terms of imparting values in children and developing in them life skills to make them responsible citizens of society. This gives an insight into the formulation of curriculum framework and pedagogical innovation and intervention in order to make the teaching learning process meaningful.

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