# METHODS OF ENVIRONMENTAL TEACHING AND LEARNING

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**Summary**

Rooted in the social sciences, the discipline of education generally and the teaching-learning process in particular lacks the rigor of the exact sciences. Consequently, theories of education are *prescriptive* in character mainly because they cannot be verified experimentally. The practical implication of this is that, whereas there are general guidelines with regard to best practice in teaching, there is no unique or universal teaching-learning method for school children, and the method to be adopted in a given socio-cultural context reflects the values, norms and sensitivities of that context.

There are several essentially psychobiological issues that influence the teaching-learning process which must be factored into the teaching-learning process in order for it to be effective, in particular those issues concerned with children's cognitive abilities, gender, and punishment for disruptive or delinquent behavior. Attention must also be paid to the growing acknowledgement of children's human rights.

Teachers, like children and the rest of us, are subject to moods and emotions too. However, in order for a teacher to be effective, he or she must obviously have a good grasp of the subject-matter. But, above all, a teacher must command the respect of his or her class. This means that a teacher must manage his or her moods and emotions in a way that enhances respect and does not erode it.

The importance of instilling environment-respecting moral values in young children cannot be over-stated. For this a method based on stories, plays, anecdotes, etc. is

suggested. This method, which through the ages has proved to be very effective especially in cultures with deeply embedded religious or philosophical traditions, is strongly suggested for young children in all cultures.

## 1. Introduction

A scientific theory is *descriptive* in three senses: (a) it describes, in terms of one or more cause-effect relationships, what is likely to happen under a given set of circumstances; (b) the result(s) predicted by the theory can be verified experimentally; and (c) the experiment(s) used for verifying theory, when repeated, will always give the same result.

In education on the other hand, as in the Social Sciences generally, theories tend to be *prescriptive* in the sense that an educational theorist stipulates a set of conditions that must be satisfied in order for a particular outcome to ensue. One may theorize, for example, that if truancy among school children is eliminated, they will grow up to be responsible and educated adults. However, there is no historical, anecdotal or other evidence to support the theory, neither is it possible to test its repeatability. It is for these reasons that theories of education are not scientific, and neither are teaching-learning methods for conventional or environmental education.

In psychology there are different theories of education that provide insight into how teaching and learning take place and the mechanisms involved in the teaching-learning process. Educational psychologists provide much useful information gained from experimental results, observations and experience, on the basis of which they have formulated general guidelines for effective teaching and learning. It is emphasized, however, that they are only guidelines and certainly do not constitute the blueprint of an ideal or universal teaching-learning methodology.

The plain fact is that there is no unique teaching-learning method valid for children everywhere. How effective a certain method turns out to be in practice for a given class is determined by a host of factors ranging from the socio-cultural setting through personality traits to moral and cultural values of the society in question. It would therefore be perverse to imagine that a given method, which works well in a particular stratum of a certain society, would work equally well in a different stratum of the same society, or in another society with completely different socio-cultural norms, values, tradition and sensitivities. In other words, other things being equal, in order to be effective a teaching-learning method for children must be culturally appropriate to the society in which it is to be implemented. The culture-specificity of preschool, primary and secondary education is a very important factor that must be carefully considered especially in designing the pedagogic element of curricula.

What is children's education for, anyway? Most, and probably all, parents would respond to this question by saying that it is something that would unlock the child's full potential to grow up to be a law-abiding, responsible citizen with a good job and capacity for enjoying life to the full. Thus the purpose of school education would appear to be to prepare children for taking their place as valued members of society in adulthood. To this end job and career prospects become important considerations,

certainly in the final years of secondary schooling (also see 4.2 of Chapter Environmental Curricula Development for Each Age Group).

Like engineering and medicine, among others, environmental disciplines are now becoming (and have already become in many societies) professional disciplines with well defined career structures. From this perspective there is little or no difference in generic pedagogy between conventional secondary level subjects such as biology or chemistry on one hand, and environmental subject such as ecology or air pollution on the other. The same structured approach comprising face-to-face teaching, homework, laboratory and field work, etc. applies to both at the secondary level.

In our considered opinion, however, the purpose of teaching environmental education must not merely be to create and/or serve yet another professional cadre. It must also be to instill those moral values from early childhood that would engender deep respect for nature and the environment (also see Sections 4.1 and 4.2 of *Importance of Teaching Environmental Education at an Early Age*). For it is only then that individuals would be ready and willing to accept their responsibility for environmental protection and to adopt less consumptive and less polluting lifestyles without which sustainable development will forever remain an enticing but distant mirage. In other words, the focus of environmental education must also be to instill strong and enduring moral values in the young *vis-à-vis* nature and the environment. And it is this that should distinguish teaching-learning methodology for environmental education from that for conventional education. Also see last paragraph of Section 4.2, *Environmental Curricula Development for Each Age Group*.

In what follows in this chapter we will discuss the above and related issues concerning methods of teaching and learning for environmental education.

## 2. Some Psychobiological Factors Influencing Teaching and Learning

In chapters *Importance of Teaching Environmental Education at an Early Age* (Section 3) and *Environmental Curricula Development for Each Age Group* (Section 2) we discussed a number of psychological issues that underpin the teaching-learning process. In this section we draw attention to some other issues of educational psychology that refer in particular to teaching-learning methods. All these issues apply equally to conventional and environmental education.

### 2.1. Cognitive Abilities to Learn

#### 2.1.1. Role of Cognition in Learning

Psychologists hold differing views on the nature of the teaching-learning process itself and exactly what it involves. Current knowledge of both is far from complete however, and, not surprisingly, much of pure and applied research in psychology is devoted to unraveling the process and its various aspects. Historically, the learning process and all its aspects played a major part in promoting psychology as a *bona fide* scientific discipline. Psychologists generally agree that learning is a *hypothetical construct* in the sense that it cannot be directly observed, but can only be inferred from observable

behavior. And that it brings about a relatively permanent change in an individual's behavior due to his or her past experience. However, there is considerable disagreement over exactly what changes take place within the individual during learning, the mechanism(s) that bring about those changes, and the kind(s) of past experience involved in the process.

There are two approaches to inferring the impact of learning from observable behavior, and they divide the psychological community into two distinct camps. The *behaviorist* camp studies overt, behavioral changes brought about by learning, while the *cognitive* camp focuses on cognitive changes that are essentially covert. Both approaches have important implications for the measurement of pupil (and student) performance in formal education following a teaching-learning episode. Conventional methods of written and oral examinations are largely based on the demonstration of cognitive skills by learners gained from learning. However, over the years these methods have been the subject of two main criticisms: over-reliance on performance under the stressful and artificial conditions of examinations; and long-term psychological damage that failure in examinations can cause to children.

From experience we know that as a normal child grows up, his or her cognitive abilities increase enabling the individual to understand and analyze increasingly complex events, situations and problems, and his or her behavior matures as a result. With regard to learning behavior, however, there are important differences between very young children and those with learning difficulties on one hand, and older children and adults on the other, as revealed by a variety of *operant conditioning* (see glossary) experiments. For example, Dugdale and Lowe (1990) showed that in the main these differences can be attributed to the child's language development. This suggests that a child with well developed language skills is more efficient than others at learning behavior through cognition (the so-called rule-based or language-based forms of learning). It is interesting to note in this context that it is precisely for this reason that conventional *behavior therapy*, based on the principle that human behavior can be manipulated by conditioning, is losing ground to modern *cognitive behavior therapy* whose central tenet is that behavior can be changed by improving an individual's cognitive abilities. This relatively recent development has important implications for the teaching-learning process which teachers should take particular note of. .

### 2.1.2. Learning and Other Abilities

It is important to understand the links between learning and other abilities. We know from commonsense that a normal child's learning and development are closely interlinked, usually the former being directly proportional to the latter. And that learning is a cumulative process in the sense that at a given stage of a child's development, his or her ability to learn is influenced by learning (knowledge and skills) accumulated up to that stage (Howe, 1980).

Regardless of the subject being taught, a child (or an adult for that matter) will not make progress in learning if his or her reasoning, and ability to grasp and analyze concepts, falls short of what is required. This is common knowledge. Yet, many teachers often fail to make a correct assessment of the cognitive (thinking) abilities of children at different

stages of their development required to assimilate what is being taught, and this is one of the major reasons why sometimes the teaching-learning process breaks down.

Using the computer analogy of an individual's cognitive mechanism as an information-processing system, a teacher needs to do the following on which the teaching-learning method should be founded (based on Fontana (1995)):

- Identify the key elements a child needs to recognize in order to master what is being taught. In the case of arithmetic, for example, these elements would be numerical and logical skills that must be commensurate with what is being taught.
- Determine how best to relate these elements to each other and to child's existing knowledge to generate meaning and/or relevance. For this the teacher may say something like this to young children when teaching how to add: "two sweets added to three sweets make five sweets" and explain how 'two', 'three' and 'five' refer to what they already know about numbers. Given young children's natural hedonistic inclination, reference to sweets is likely to generate relevance of what is being taught to *their* world (see Sections 2.4 and 4.1of *Environmental Curricula Development for Each Age Group*).
- Ascertain the form (association for example) in which these elements be best stored in memory.
- Determine the means by which these elements can best be retrieved and used by children to solve new problems.

In order to enhance children's cognitive abilities, they must be given sufficient help with the intellectual processes listed above. Interested readers are referred to Fontana (1995) who describes them in greater detail.

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**Biographical Sketch**

**Professor Bhaskar Nath** received his Bachelor's degree in Civil Engineering from the Indian Institute of Technology, Kharagpur, India, in 1960, followed by the Ph.D. degree from the University of Wales, UK, in 1964. In 1983 he was awarded the D.Sc. degree by the University of London for his outstanding original research (according to citation) in numerical mathematics. In 2001 he was awarded the *Doctor Honoris Causa* (Dr.H.C.) by the University of Chemical Technology and Metallurgy, Sofia, Bulgaria, for his contribution to environmental education.

After having taught at the University of London for more than 27 years, currently Professor Nath is Director of the European Centre for Pollution Research, London; Executive Director of International Centre for Technical Research, London; Editor of *Environment, Development and Sustainability* published by Springer; visiting professor to several European universities, and consultant to a number of international companies and organizations. Professor Nath's research interests include Numerical Mathematics, Elasto-Hydrodynamics, Philosophy, Environmental Economics, Sustainable Development, and Environmental Education. He has more than 100 scientific publications in these and related areas including 13 books.