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NON-FORMAL METHODS OF CHEMISTRY EDUCATION

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From about 1980's non-formal education became very popular in India, but the thrust from the establishment and promotions through official channels made the movement formal in operative terms.

Though non-formal was defined on paper in terms of flexibility, openness, ease of entry, relevance to life, creativity etc, in effect, much of what was provided under this was sub-standard education for the poor and disadvantaged groups.

Various agencies made commendable progress in the field of non-formal education in science and one of them which made remarkable contribution to spread the spirit of science through a functional mass movement is The Kerala Shastra Sahitya Parishad.

Over the years science education, particularly Chemistry education became so monotonous and dis-interesting for the students. Chemical abstractions are poured in verbal form into the students' minds with stereotyped approaches in teaching and learning. Students relay largely on rot memory of assorted heavy chemical terminology for getting through the examinations. The whole process is devoid of any joy but chemistry can be presented in non-formal joyful and meaningful ways.

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Today, there are modern chemistry education methods that can tap out the mental enthalpy of the students.

Joyful learning does not mean always signing and dancing or seeking joy in exterior stimulants. In creative learning, the physical forms of joyful activity gradually give place to intellectual discovery, the joy of sharing knowledge in a learning society, the ecstasy of getting the final illuminating wisdom to solve difficult problems by oneself after undergoing the agonies of the incubation period and the joy of finding practical applications to pure science.

Modern science education has shown that these joys are open not only to the likes of Kekule and Rutherford but also to each student of science. The best of modern science education is all about making the joy of the search, struggle and final excitement of discovery available to every young student of science. Many disadvantaged learners and even normal and above average students, disadvantaged through imposition of wrong methods find it difficult to experience this joy or enter the scientific mansions.

There are a number of models of teaching which deals with non-formal science education. To list a few:

1. Directed Activities Related To Text (DART) Model.
2. Technology Enhanced Secondary Science Instruction (TESSI) Model.
3. Outdoor Laboratory Model.
4. Cross Age Teaching Model.
5. Science Story Model.
6. Concept Cartoon Model.
7. Science-Technology-Society (STS) Model.
8. Science and Youth (SAY) Model.
9. Cooperative Learning Model.
10. Stage Craft Model.

Let me explain a few of these models.

Directed Activities Related to Text (DART) Model

This Directed Activities Related to Text model of teaching leads the learner from "content" to "context". By and large all learners get a quantum of knowledge from direct reading of text. Normal reading where the eye absorbs information in a continual flow is receptive, but reading of science texts has to be reflective, compelling the reader to break, have a second look-at and reflect. Such a style of reading does not come naturally and must be taught with a variety of techniques, which helps assimilate and accommodate information from texts properly. This is where the DART model helps.

Here the science learners read and re-read the passage so that they acquire the skill of reconstruction of the text. In science, where experimentation is associated with the main text, DART forces the learner to reconsider, reflect and hopefully absorb the procedures for conducting the experiments carefully. Thus through the use of DART model, the context of activity itself becomes an enlarge text to the learner.

Technology Enhanced Secondary Science Instruction (TESSI) Model

Many educators are outspoken advocates of the potentials of enhancing learning with intelligent technologies, while many others are apprehensive regarding the changes, which follow when computers are brought to the class rooms. Well-designed technological systems have the potential not only for imparting the goals of science education but also for providing the means for achieving these goals. TESSI resulted from collaborative research undertaken by teachers and researchers to demonstrate that instructional effectiveness of computer courseware to document appropriate strategies to overcome barriers to its use, to stimulate implementation of computer and multimedia technology within existing curricula and to optimize the pedagogical use of technology.

The potential of Technology Enhanced learning environments is realized in the extent to which it supports or alters cognitive processes. However these benefits are not automatically realized merely because of the presence of technology. A successful technology enhanced environment encourages learners to use its resources and information deeply and extend thinking. TESSI's goal is to develop a pedagogical model that allows teachers to enhance student learning by systematically and successfully integrating existing technology into their instructions. The result is transformed class room that is different from traditional class rooms both

pedagogically and in terms of relationships among teachers, students and the learning environment.

Outdoor Laboratory Model

This Outdoor Laboratory Model envisages that the school and its surroundings must be devised as an extended class room called outdoor lab. The model involves replanning and restructuring school site so that the teacher could take advantage of the local environment. The Outdoor Laboratory experiences will help the students to be aware of the local problems with the community and its environment. School and its surroundings if visualized and utilized as the Outdoor Laboratory surely will help the students to be aware of their place in the environment, helping them to connect school learning to every day problems. The Outdoor Laboratory work follows an open ended questioning session along with the teacher to ensure clarification of concepts. "Learning in context" and "context to content" transition are two characteristics of the Outdoor Laboratory.

Cross Age Teaching Model

This Cross Age Teaching Model is an inter-group instruction model in which the team leaders or students of higher classes get chance to guide the learning process by helping the team members or younger class students. The cross age teaching not only provides more autonomy and inter personal communication skills to learners but also helps them to develop as future science teachers. Many of the problems that arise out of the traditional class room which suffer a lot from the wide hierarchical gulf in relationship between the teacher and learner can be rectified through cross age teaching model, where the teacher assumes the role of an effective team manager than a custodian of knowledge.

Science Story Model

The model visualizes that in many cases of Chemistry education, learners face situation in which they can frame their own mental statement or descriptions designated as science stories which can be developed by the teacher through analogies and metaphors and finally can be integrated into the original concept.

Concept Cartoon Model

This model uses the cartoon style drawings which illustrate of scientific concepts in everyday situations. In each, the cartoon characters offer alternative view points on

particular science concepts. This model is a powerful means of involving and motivating students to argue about science and to set up investigations to develop their ideas further. The major purpose of the model is to stimulate thinking about science and to enhance awareness about science in everyday life.

Science-Technology-Society (STS) Model

In this the students are required to play an active role in their learning through role-playing, simulations, discussions, decision making exercises etc, based on an issue in Science or life. This issue is the starting point of integration in science teaching. Such issues must preferably be inter-disciplinary in nature and can lead to relevant scientific fact and principles. This integration occurs not only in science but also the total curriculum. STS means focusing on real world problems instead of starting with concepts and processes which teachers and curriculum developers argue in terms of future usefulness to students.

Science and Youth (SAY) Model

This model encourages a kind of group problem solving that goes on in the work place rather than having students complete exercises in a formal environment controlled by adults. The major objective of SAY model is to introduce hands on, heads on, science activities to large number of students. The teaching-learning activities of SAY model can be performed in out-of-school settings such as parks, camps, industrial plants as well as in class rooms. The model is characterized by a kind of playfulness which generates exploration, experimentation and learning.

Cooperative Learning Model

This model is a group instructional strategy. Here, a task is given to a small group of students who then work together to produce a final answer. They may be evaluated by participant observation. In this model, students usually need instruction, sharing responsibility, encouraging and helping others who have difficulty in learning.

Stage Craft Model

This model utilizes the products of theatre mainly fun, excitement and aesthetic appreciation. Performances of scientific plays, skits or mimes based on curricular or intra curricular components on the platform of a theatre can act as a powerful

source of science education. Here an appropriate blend of various domains is made use of which helps to pitch up the science contents for various levels of science learners. The success story of the performance done by Floating Point Science theatre, UK is an example for the effectiveness of stage craft model. The model provides a lot of non-formal opportunities to the science learners and helps them to extend their life even beyond class room and school.

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