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Editorial

Genesis of the Journal of Educational Endeavours sprouts from the soil of sixty years of Teaching - Learning activities in St. Joseph's College of Education for Women. The college has been a stage for seminars, symposia and workshops on educational concerns. Now, through a journal, published every six months it intends to create a stage to share and discuss the observations of educators; ideas about any of the educational endeavours, trends, issues, and research findings. To facilitate this, each issue of the journal will come up with a specific theme.

This inaugural issue, with the theme, 'Teaching is Reaching' is coming as a home journal to introduce ourselves to you all. There is no existence for teacher without the learner. There is no use of teaching if it fails to promote learning. Though the teacher preparation begins in a college of education teacher development is a continuous necessity in the ever changing life. Moreso, the teacher needs to understand his / her inner world, as much as he understands the outer world in the form of different subjects, to develop emotionally, morally and spiritually. He can set an example by being a model to the tender minds. The activity of teaching involves the suitable and most beneficial method or methods and materials ranging from black board to the web to deal with the subject matter. While doing so he is to reach the learners with variation in abilities, interests, and personal qualities developed out of different backgrounds. On the other side he is to be sensitive to the social, national and global needs. Development of soft skills or life skills along with the technical skills, healthy environment both internal and external, healthy relationships and practices are some of the current concerns to be addressed in teaching - learning situations.

— Aruna Mohan

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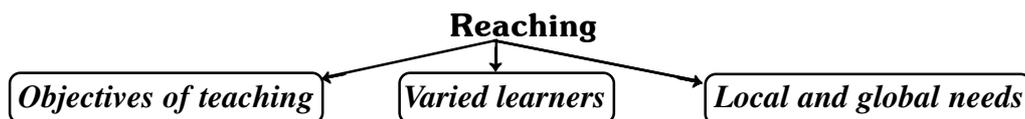
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TEACHING - TO MERGE THE EMERGING TRENDS

* Dr. G. ARUNA

The purpose of teaching is to prepare the learner for life by imparting the necessary knowledge and skills. Learner needs to be developed holistically to make a right use of the knowledge and skills. When the societies are degenerating with dominant material interests, increasing immorality and threatening violence teacher needs to be more alert to play his judicious role. Fear, anxiety, conflict, enmity are seeping into the classrooms. Hence the teacher has to promote every learner to feel the situation to think independently, critically and even creatively, to take right decisions and solve his problems. At this stage of human evolution self-awareness develops self-discipline with a matured balance of emotions.

Many a teacher educator, to a lesser or greater extent, has been addressing herself for the following. She has been spending time to plan a lesson to cultivate new knowledge relating to the old knowledge, to undertake necessary activities to bring clarity of the subject matter and to develop skills. Meanwhile she has been questioning the students to develop their observation, critical examination, discrimination, and drawing their attention to the gaps in knowledge to trigger their capacity of imagination and creative potentials, and to observe a problem holistically and solve it. Primarily any teacher is to teach the learners of different socio economic backgrounds and of varied capacities to fulfil the objectives of the teaching the subject suiting to the local and global concerns.



The teacher educator has been following a relevant method, model or strategy aiming at establishing relationship between teaching inputs and learning outcomes to enhance retention of knowledge and its transfer wherever relevant and necessary. But left with a question, 'Is this all education?' Is teaching only reaching the meaning of the subject matter or more? Is it not narrow, in its purpose of preparing the learner for life ?

Objectives

1. To identify the global and native trends needed for human development.
2. To propose a few approaches that promote learner development.

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The Present Trends

The report of UNESCO of the International Commission on Education for the 21st century is titled "Learning the treasure within proposed four pillars of education- learning to know, learning to do, learning to be and learning to live together. It means that teaching is for learning.

We, the educators are to rise to the contextual and global educational needs and also to hold the questions to investigate the possibilities of fulfilling them in class room transactions. It is the responsibility of the educator to inquire whether education is addressing the life totally and meaningfully in the present context or simply focusing on its parts.

Karan Singh, in his article in a UNESCO report has mentioned that national educational systems are unable to provide the new paradigm of thought that human welfare and survival now require. He proposed that spiritual dimension will have to be given central importance in our educational thinking for the growth of creative and compassionate global consciousness.

The teacher is to grow and develop in this respect irrespective of the cultural, national and religious background. Jacques Delors, the Chairman of the International Commission on Education 1996, called on to understand the world's erratic progression towards certain unity. He felt that this process must begin with self-understanding through an inner voyage whose milestones are knowledge, meditation, and practice of self-criticism. The commission even felt that the aims of education and expectations of people have to change to meet the challenges of this century. It is time to bring in the importance of life skills proposed by WHO to develop tension free life styles that can improve the life skills of the individuals. The life skills are : 1) Critical thinking. 2) Creative thinking. 3) Decision making. 4) Problem solving. 5) Effective communication. 6) Good inter personal relations. 7) Self awareness. 8) Empathy. 9) Coping with emotions and 10) Coping with stress.

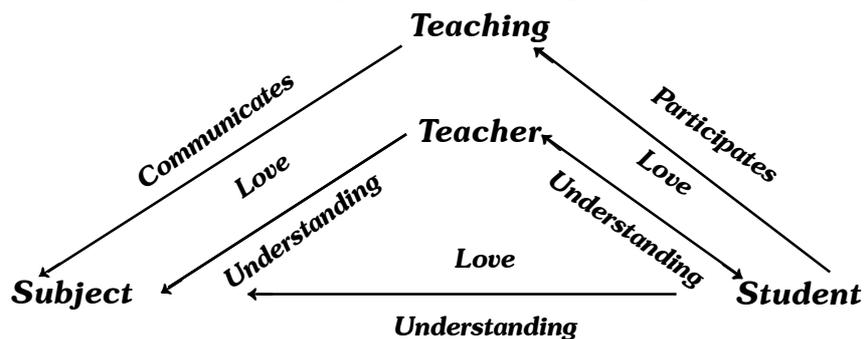
WHO defined life skills as "abilities for adaptive and positive behaviour that enable individuals to deal effectively with the demands and challenges of everyday life." They are the resources to deal with the realities of day-to-day life competently and harmoniously that help promote physical and mental well-being. The discussion document of the National Curriculum Framework for School Education, India also has recognized the importance of linking education with life skills. It is through these skills that pupils can fight the challenges of drug abuse, violence, teenage pregnancy, AIDS and many other health related problems.

The spirit of life – long learning is to be imbibed primarily by the teacher educators for their personal and professional development, so that they can exercise their cognitive and affective capacities in their rightful places to the needed extent.

For Human Development

A teacher educator can care to mind what Noam Chomsky proposed.

“... teaching should not be compared to filling a bottle with water but rather to helping a flower in its own way. As any good teacher knows, the methods of instruction and the range of material covered are matters of small importance as compared with success in arousing the natural curiosity of the students and stimulating their interest in exploring on their own”.



At this juncture the teacher herself has to be a visionary, futuristic in orientation to reach the children, without confining herself only to making the students study in pass the examinations, make them ready to get a good job but also to meet life intelligently, affectionately and happily without trying to escape from the problems or ignore or be afraid of the problems, but blossom completely in all their potential.

1. She has to help them in how to think rather than what to think, to move them from mechanical thought to original thought.
2. To help the students to become more concerned, more gentle, generous and sensitive.
3. To make them feel that the world of nature and the world of man are interrelated.
4. To bring about a good human being who has a feeling for global relationships without nationalistic, religious and regional prejudices.
5. To help them not to be caught up in their own network of problems, desires, and pleasures.
6. To help them to become sensitive to other human beings who suffer, struggle, and have great pain and the sorrow of poverty and to develop empathy.
7. To help them in learning to watch their own prejudices, beliefs, aggressive trends, resistances and reactionary thoughts and emotions.
8. To help them watch their constant occupation with themselves which breeds various forms of conflict and unhappiness.
9. To help to learn by watching the things about them, the nature around, and society in which they live.

10. To make them realize that the real issue is not the acquisition of knowledge but the depth of the mind that meets the knowledge as it is the quality of mind that matters in education for life.

Thus there is learning from books as well as learning from nature, the mind and heart of human being. We are not only put the world's affairs first but also to deal with the inner confusion, uncertainty, anxiety, and conflicts. Thus the classrooms are ready with teachers and students to question on the deeper aspects of life - Who am I ?, Where do I come from ?, What is this made out of ?, What is going to happen to me ?, Why do people fight ?, Why do they hate ? Is there a higher power? They can deal such questions from broader perspectives.

Can we along with our learners care to mind at this juncture what the most renowned scientist, Einstein said : "A human being is part of the whole, called by us 'Universe', a part limited in time and space. He experiences himself, his thoughts and feelings as something separated from the rest – a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty."

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TEACH THE CHILD TO SOLVE THE PROBLEMS OF LIFE

* J. R. Priyadarsini

Education should prepare the child for complete living. Mathematics is a subject which was born out of the felt needs of man. The fundamental aim of mathematics is to make the child solve the problems that he faces in the day to day life. Therefore in the school a child should be trained to solve problems offered by life itself. Thus this paper highlights the need of real life problem solving and the role of school and mathematics teachers in training the child in this direction.

Education is the development of all those capacities in the individual which enable him, control his environment, and fulfil his responsibilities. One of the fundamental aims of education is preparation for life i.e. education should prepare the individual to lead a better life. The biological stand point aims at the development of the ability in a person to lead a happy and complete life.

Mathematics is the numerical and calculative or quantitative part of man's life and knowledge. It is an admitted fact that wide spread are the applications of mathematics and enormous is its practical value. The use of mathematics in our daily life is immense. It has bread and butter value. Every one without any distinction makes use of mathematics right from morning till the night of every day. Shut out mathematics from daily life and all civilization comes to a stand still. When man first wanted to answer the questions like How many ? How much ? How big ? How long? etc. he invented arithmetic. The knowledge of this subject was born out of the felt needs of man.

Mathematics is a subject of problems. In school, the child is to be trained in the art and craft of problem solving that develops reflective thinking. Edward Lee Thorndike (1921) produced a text for student teachers entitled "The New Methods in Arithmetic" in which he emphasized the processes which life will require and the problems which life will offer.

Training children to solve problems is a means of training them to meet and surmount difficulties and for enabling them to solve problems offered by life itself. Therefore, problem solving in mathematics should provide a real training for life and prepare the students to face new and even unexpected situations in various walks of life.

But in the present situation, the class room teaching of mathematics is different and misdirected. It has become routine and divorced from life. Teaching and learning of mathematics

is just confined to the completion of syllabus and attaining success in the examinations. Hence it has become mechanical without preparing the child for life. It is evident that training for life and real life problem solving are not provided in majority of the schools. Therefore it is high time the curriculum framers, text book writers and educational planners linked education meaningfully and realistically to life.

Objectives of the Present Study

1. To identify the need of solving real life problems.
2. To highlight the teacher's role in orienting the pupils to solve the day to day problems.

Need for Real Life Problem Solving

There is some criticism on mathematics that "It is too remote from life to interest the students".

"It is more abstract in its nature". "Teaching is confined to the classroom and not related to pupil's life." The remedy for all these is the introduction of the applications along with pure mathematics. Knowledge is useful only when it is applied in practical life. In solving problems related to life or in performing daily tasks we apply knowledge. In order to make the study of mathematics purposeful we have to link it with our actual life needs. A child will appreciate better those mathematical problems which are related to life. By solving these problems the pupils can also learn how to tackle the daily life transactions like buying and selling, profit and loss, interest etc. which are most essential in life.

Moreover the major aim of teaching mathematics at the secondary stage is to develop in the child the ability of solving problems of life. Therefore it is very much essential to train the child in the art of solving the real problems which they usually face in their real life.

In this regard a research study was conducted by J. R. Priyadarsini (1998) on the topic "A Study of the Present Position of the Nature of Mathematical Problems in the Text Books of Primary Stage and the Opinions of Teachers Towards Them". It was noticed that the teachers have shown very favourable attitude towards the need of real problems. They have suggested that the real problems should be given more weightage in order to make the problem solving more interesting and useful for life.

James, A. Mc Clellan (1900) Principal of the Ontario School of Pedagogy in Toronto together with *Dewey* (1900) produced a volume entitled "The Psychology of Number and Its Applications to Methods of Teaching Arithmetic" in which he mentioned that asking the child to find how much 4 times 8 feet is or 9 times 32 cents is would be meaningless and senseless because there is no motive, no demand for its performance. The pupil should be trained that all

the mathematical operations could be instantly interpreted in their nature and function as connected with the process of measurement.

National Council of Teachers of Mathematics Commission on Post War Plans (1945) presented a report on 'Suggestions for improving mathematical instruction' in which they suggested that children appreciate the value of arithmetic when it helps them to meet the needs of vital importance to them.

From the suggestions of the previous researchers also it is evident that the scope for solving real problems is limited in the textbooks of mathematics and the training of students in this direction is also not satisfactory.

Role of Teacher in Orienting the Child in Solving Day-to-Day Problems

In this modern and competitive world, in most of the schools, it is found that retaining the students for a long time in the schools, blind cramming and rote memorization of the content are given more importance rather than joyful and meaningful learning. Now-a-days most of the teachers are training their wards to learn by heart even the solutions of mathematical problems instead of developing logical thinking, reasoning and analysing abilities which will make the students solve the problems easily.

Lesh R Akertstron (1981) and Mesher (1980) found that if important problem solving experiences are identified, based on observations of everyday situations in which mathematics is used, then it becomes obvious that many of such type of problems are not represented in most instructional development.

In mathematics if problems that are related to life are included in the text books and adequate training is given to the pupils in solving such problems, definitely, they can face their future with confidence. Some problems of the following nature can be introduced in the text books of mathematics.

Problem 1 : Your mother asked you to buy curtain cloth for the doors of your house each of 6 m. long and 3 m. wide. In order to find out how much of cloth you have to buy what would you do ?

Problem 2 : Your father has borrowed a sum of Rs. 10,000/- from your uncle at the interest rate of Rs. 10/- per year. He wants to clear the debt after 2 years. What is the procedure that you would suggest to your father to follow to pay back the money.

When such problems which are realistic in their nature are assigned to the pupils definitely they solve them with interest and thus get themselves ready to solve real life problems. Some projects like fencing the school garden, painting the classroom walls, preparing the school and family budgets etc. may also be assigned to the pupils as projects.

The ability to apply mathematical knowledge will certainly develop in the child some life coping skills like critical thinking decision making, problem solving etc. because problem solving skill means "the skill to understand and deal effectively with problems in day to day living".

Therefore the school, and the teachers have to keep their direction towards the training of pupils for real life problem solving which would go a long way in dealing with most of the problems of life effectively.

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TEACH - REACH - ENRICH

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Education is a sacred partnership between the teacher and the pupil. This demands a lot from both and delivers a lot to each. At no point of time in the history of the world, have we seen the relationship between the teacher and taught so diluted and distorted. The truth is that the need of this relationship is becoming more and more important in the present global scenario where the hours spent by the student in the presence of the teacher are increasing, so also, the influence of the teacher on the student. The need to maintain a favourable classroom climate by the teacher endowed with teaching competencies, professional qualities, and positive attitudes becomes increasingly important.

Education is a process of human enlightenment and empowerment for the achievement of a better and higher quality of life. Hence the working philosophy that has to affect the quality of education inevitably demands performance based approach in the classrooms. The teachers must equip themselves with the required competencies because teaching is both an art and a science.

The Secondary Education Commission (1952) rightly points out "We are convinced that the most important factor in the contemplated educational reconstruction, is the teacher, his personal qualities, his educational qualifications, his professional training and the place that he occupies in the school as well as in the community". The role of the teacher has thus been made very clear.

A teacher occupies a pivotal place in the society because he transfers the intellectual tradition from one generation to the next. He also helps in the silent social revolution that takes place in the society. His duty does not end in the classroom but extends to the society and towards the nation at large. He should keep abreast with the national and international developments and accordingly adjust his methods and approach.

The National Policy on Education 1986 comments thus on the role of teacher. "The status of the teacher reflects the socio-cultural ethos of a society; it is said that no nation can rise above the level of its teachers. The government and the community should endeavour to create conditions which will help motivate and inspire teachers on constructive and creative lines. Teachers should have the freedom to innovate, to devise appropriate methods of communication and activities

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relevant to the needs, capabilities and concerns of the community". Since ages the teacher has been looked upon as some one possessing knowledge superior to that of his students. At the same time, however, he is not expected to be a walking encyclopedia of knowledge.

The Teacher and the Taught - A Bond

Teaching is a social phenomenon. It is difficult to define the term teaching, because teaching behaviours have several dimensions. Phillip W. Jackson says "Teaching, characteristically is a moral enterprise. The teacher is out to make the world a better place and its inhabitants better people". Given the teachers moral values and the social significance of his work, it is not surprising to find that educational researches, for years, have focussed chiefly on the improvement of teaching.

B.O. Smith puts it like this, "Teaching is a system of actions intended to induce learning through inter personal relationship". According to Smith teaching is that activity which influences learning in which inter-personal relationship is an essential situation.

The teachers teach in their respective areas of specialisation, which is of course one-sided. A teacher imparts all her knowledge while the students make an effort to assimilate. This is a common phenomena in a classroom. In simple terms, a classroom has a mix of children, some studious, some mischievous and some who just have no specific objective or sense of direction. Yet it is the teacher who establishes a bond between herself and the student and teaches. This is an age old tradition.

Right from the age of the Vedas and the Epics, the 'teacher- taught' or the 'Guru-Sishya' relationship had its pre - eminence. Dronacharya - Ekalavya relationship is an important and striking example of this. Gurus did not teach for love of money, but because of their desire to improve the knowledge and character of their pupils.

Teaching learning is no doubt an interaction between the teacher and the taught. Achievement on the part of the students would be poor if transaction on the part of the teacher is not strong and effective. Transactional strategies or communicating the content to the students is very important. The students, specially the young children have a short span of attention, hence the learner centered teaching has to be planned. A variety of activities are to be organized for participatory learning, which is joyful and meaningful.

Classroom performance of the teacher comprises of major areas like instructional, transactional, evaluational and classroom management. This requires the acquisition of necessary skills, competencies, attitudes, approaches and utilisation of the same in the class.

In terms of her own personal makeup, her training, her particular area of study each teacher can develop as an artist, capitalising upon her own special inherited or acquired talents.

But there are basic skills and principles of good teaching, as in every art, and it is only by mastering these and adapting them to her own style that she can develop proficiency in teaching.

As a sequel to the above, the following questions arise :

Who is an effective teacher - What is effective teaching?

Who is a successful teacher - What is successful teaching?

Who is an ideal teacher - What is ideal teaching?

To fulfil the duties of the above roles a teacher plays, it is necessary to develop in her the corresponding competencies. Teaching is a multifaceted activity given within the four walls of the classroom. To perform well, at any stage of education, these competencies are required in the teachers. Every teacher should agree with Thomas Arnold who said "I desire my student to drink from running stream instead of a stagnant pool". Every teacher must be up-to-date in the competencies of teaching.

An Ideal Teacher

According to Prof. Raymont "the teacher must be a compendium of all virtues, endlessly patient, unerringly just and imperturbably good - tempered". The teaching profession requires every teacher to stand committed to it for which certain human qualities will have to be acquired and put to actual use in the transactions with the learner. Fundamentally every teacher should have commitment to the learners, which implies, teachers genuine love and affection for the students, tolerance for their mistakes, and more important, self analysis, which is very essential for commitment.

An Effective Teacher

Effective teaching can be said to occur when the intended changes, selected by the teacher, are both desirable and constructive for the learner and the intended changes are actualised as a result of teaching.

To further elucidate, there are two processes that go on in a classroom, simultaneously. Firstly the teacher communicates the subject matter or the content. This is a routine process. But, one can observe a conspicuous difference that favours a teacher's presentation, which involves the teacher's delivery, diction, body language, clarity of thought etc., that leave a lasting impression on the young minds. The content is the curriculum, that is prescribed, it is 'what' the teacher teaches. The 'way' or 'how' the teacher teaches is the latent curriculum. Interestingly, it is the latent curriculum that has an amazing influence on the students. According to Sir John Adams "Teacher is a maker of men". No doubt, it is the teachers latent curriculum that makes or moulds the students.

Why is the latent curriculum important, as such, more important than the prescribed curriculum. The teacher, has the responsibility of not only completing the syllabus, but she is also involved in a more important exercise, that of shaping and moulding the personality of her pupils. The teacher has to inculcate values, form attitudes, develop skills, and help pupils to transform in to full-fledged personalities. Teaching is essentially a spiritual process involving the contact of mind with mind. A good teacher is a powerful and abiding influence in the formation of character.

A Successful Teacher

A successful teacher is expected to possess qualities like :

1. should be educated in the literal spirit of learning so that he may make his contribution as an individual and a citizen.
2. should be competent to represent the education, profession and his subject matter filed in the school and in the community.
3. should be able to use a variety of effective methods and procedures.
4. should have thorough knowledge of both theory and practice of the subject matter.
5. should be capable of organizing, supervising and participating in co-curricular activities.
6. should be interested in continued growth through participation in community activities in in-service education, research and experiment.
7. should be able to function effectively in the guidance programme of the school.
8. should know the objectives before the nation and should involve himself in the preparation of future citizens.
9. should be well informed about Indian thought and culture.
10. should take pride in teaching profession, have an optimistic attitude towards his job and a spontaneous pleasure for teaching.
11. should respect values of democracy.
12. should have healthy emotional development and be cheerful in disposition. If a teacher is joyful, children will rejoice in life with all its variety.
13. should be well informed, curious and alert and should have habits of wide reading.
14. should have high degree of communication skills, clarity, precision and logic.

A successful teacher takes responsibility for planning, guiding and evaluating education. He is an individual with culture and citizenship who believes that his job is critical to the progress of the community and nation. The UNESCO in its Resolution of October 1968 on the status of teacher said "Policy governing entry into preparation for teaching should rest on the need to provide society with teachers who possess the necessary moral, intellectual and physical qualities,

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who have the required professional knowledge and skills". In view of the teacher's crucial role in improving the quality and coverage of education, the New Education Policy to attached a very great importance to the pre-service education of the teachers.

Classroom Climate and its Consequences

Classroom climate is a major factor that influences the students and speaks of the teacher too. Both noise and silence in the classroom are meaningful. Noise is meaningful, when pupils ask, answer, discuss, recite etc. The sounds of silence are meaningful when pupils memorise, think, write etc. In some classes, one may find students laughing over a joke, writing on the black board, interacting with the teacher or with each other. In such a classroom we find that, there is an unseen closeness or rapport between the teacher and the pupils. Such a subtle nearness, between the teacher and the pupils is very essential for positive learning and growing. A teacher who is able to establish such an atmosphere in the classroom will be able to educate her wards better. Learning takes place in a very positive and definite manner if the classroom atmosphere is cohesive, supportive, participative and open. It is the teacher's responsibility to provide such a healthy learning climate to her pupils. The teacher should work in such a manner that, the noise of the students becomes sensible and musical, they develop the initiative to ask questions, start loving the teacher and the subject she teaches. In such an atmosphere the teacher also gets so very involved and engrossed in teaching that when the bell goes, both the teacher and the pupils are sad that the period or class is over.

Magical Mantra to be followed by Teachers

As teachers, all of us want such a classroom climate, don't we? Well, what should be done to secure such a climate? Teachers, please.....

- ❖ Start loving your pupils.
- ❖ Be clear and consistent in what you want from them.
- ❖ Teach with dedication.
- ❖ Be alert to everything and everyone in the class.
- ❖ Introspect everyday.
- ❖ Locate your drawbacks and improve.

Prof. Humayun Kabir says "Teachers are literally the arbiters of a nation's destiny. It may sound a truism, but it still needs to be stressed that the teacher is the key to any educational reconstruction". In a classroom, an optimistic and cheerful teacher offers her pupils, pleasant gestures, hopeful words and graceful manners. On the other hand, an unhappy and pessimistic teacher only reflects annoyance, sarcasm and repulsive behaviour. This has a direct influence on

the psychology of the pupils and their attitude changes. It has a transfer effect, that is, either a positive or negative attitude of the pupils, towards the teacher, which is transferred on to the subject taught by the teacher. The teacher has to realise that her way of teaching enables her to reach out to the pupils. The influence of the way the teacher handles the class is long standing, sometimes life long. It has far reaching consequences. The pupil's may forget what a particular teacher taught, but they would always remember how she taught, well or otherwise. The pupils remember a teacher, because she inspired them, created in them an interest for the subject and helped when it was most essential. Such a teacher's influence is life long on the students, because she reaches out to her students. Teaching, therefore is reaching out to enrich pupils, although enrichment takes place at both the pupil and teacher levels. The pupil becomes rich with the content (subject matter) and the teacher with the contentment she experiences.

The kind of a world we want for our children in future, depends entirely on the quality of education, we provide to them now. We, the teachers, who are indirectly the architects of the nation should, therefore, develop a proper bent of mind for the profession and the pupils. Let us do our job with dedication and commitment. Dr. Ballard says "The teacher of the future will be less concerned with impressing his personality on his pupils than with gaining as much insight as he can into the personalities of his pupils and trying to find in each of them the lamp that illuminates and the spring that motivates". Let us give our children what is justly due to them. Let us guide them along and give them the tools to unlock their own potential. Let us all teach and reach out to our pupils and enrich not only them but inturn also ourselves.

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CURRICULUM FRAMEWORK FOR A COMPONENT 'WATER' - A MODEL

*** Dr. Sr. G. Theresamma**

Environmental education is a programme that is being promoted all over the world. It is a matter of pride that our National documents like the Report of the Education Commission (1964-66), the approach paper for the Curriculum of the Ten Year School Programme (1975) the National Policy of Education (1986) and National Curriculum Frame Work for School Education , NCERT (2000) have all emphasized the need for Environmental Education. But the existing textbooks do not emphasize it. As per the opinions of the science teachers of secondary schools of Guntur District, collected as part of author's Doctoral study, it was felt that more of Environmental activity orientation is needed apart from the content in the present textbooks. Hence the researcher proposed a series of modules relevant to different stages of schooling on the component 'water' as a model based on the concentric approach for class I to X as an extension for the present curriculum related to environment. One of the special features of the modules is an activity, which is simple and operational.

Significance of Environmental Education in Schools from Class I to X

Population, pollution, poverty, and peacelessness are the four major problems the world is now facing. Urbanization, industrialization, automation, and population explosion along with pollution, acid rains, gas leaks, and nuclear disasters have made man a helpless victim. Environmental conservation has now become an important, essential axis for the economic well-being and the peaceful co-existence of human activity on the surface of the earth.

The need of the hour is environmental protection since the twin problems of environmental pollution and ecological degradation are threatening the very survival of mankind. Hence this calls for both a global and a national action to tackle this multi-dimensional problem through multi pronged strategies, viz. socio-economic, scientific, and technological. It is essential that every citizen possess the required understanding of the serious dimension of the problem.

Environmental education is a programme that is being promoted all over the world. The ultimate aim of environmental education is to aid learners in becoming environmentally knowledgeable, and above all, skilled and dedicated human beings who are willing to work,

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individually and collectively, towards achieving and maintaining a dynamic equilibrium between the quality of life and quality of the environment. In fact education is the most important human activity in the world wherein 20 percent of the world population is actively engaged in the teaching-learning process at any given time.

Objectives of the Study are :

- i. To inquire into the opinions of teachers on the role of curriculum in creating Environmental awareness.
- ii. To propose a way of developing a teaching module from classes I to X on one component, water using a database.
- iii. To propose modules on the component 'water' for enhancing environmental awareness among the pupils.

The present curriculum of general education i.e., classes III to X do have ample material on environment and its problems. But environmental education is not just knowledge only, it is far more. It is the development of proper attitudes, the awakening of the urge to make the world a better place to live in, to be aware of what is happening around us, and above all to act without fear. For this to happen, the curriculum should have out of classroom activities. Opinions on this need and importance were gathered from science teachers on environmental education issues.

Methodology : Descriptive survey was followed to collect and analyse the opinions of teachers primarily. Textbook analysis was done to identify the content composition on 'water'.

Sample : A stratified random sample of 64 science teachers of secondary schools of Guntur district.

Tool : An opinionnaire was used to seek the opinions of science teachers about the school curriculum on the coverage of environmental knowledge and also about various programmes that are affecting in creating an environmental awareness. This consists of 15 open - ended questions.

Findings

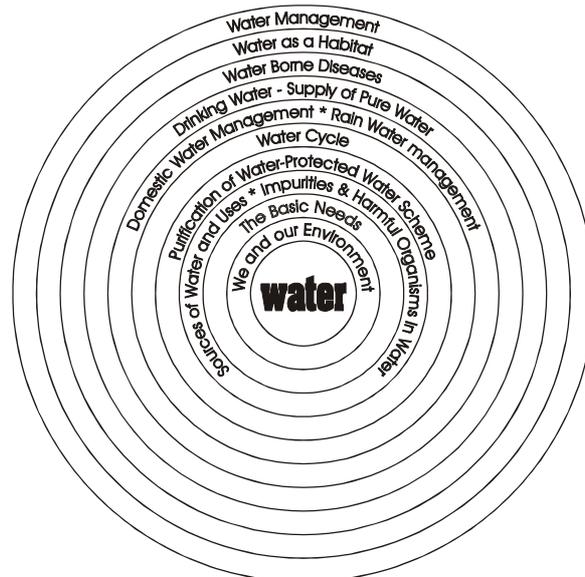
- ❖ Nearly 60 percent of the teachers felt that the school curriculum contains knowledge about environmental education.
- ❖ Nearly 74 percent of the teachers felt that the pupils had only moderate level of awareness about environment through the study of textbooks.
- ❖ Nearly 35 percent of teachers said that they are having clean and green programmes, 20 percent of teachers are conducting competitions on environmental awareness, Whereas only 8 percent have water conservation programmes, literacy campaigns and rallies on environmental awareness, and motivating children using AV aids, demonstrations, and lectures on environmental awareness.

- ❖ Nearly 65 percent of the teachers felt that awareness can be created by exposure to mass media like Radio, TV, and films where as 15 percent felt it is possible through street plays, rallies, songs, cultural items, Kalajataras, and field trips.
- ❖ Nearly 60 percent of the teachers felt environmental education should be imparted as a separate subject and the remaining 40 percent to integrate with in the curriculum.
- ❖ Nearly 35 percent of the teachers felt that clear and specific understanding has to be given to students by practical applications.
- ❖ Nearly 34 percent of the teachers felt that concept wise examples be given for better understanding of the environment related to daily life.

The quantitative data so obtained has shown that the present curriculum needs to be modified to make it more activity based. It was opined that practical orientation with real life situations will give enhanced awareness. Hence the researcher has prepared the modules suitable for classes I to X confining to 'water'.

- ❖ The researcher has prepared modules with primary focus on child - centered and activity based approaches.
- ❖ A series of ten modules were prepared to throw more light on the component 'water'. The researcher has selected the component 'water' because it is one of the areas of the present study and one of the five elements of nature, which are the basic needs of human beings. Water is indeed the lifeline of human existence.
- ❖ The modules are designed so that they would provide the necessary framework for development of other components of environment.

The following figure shows the concentric method of development of the ten modules.



Development of Modules

One of the special features of the modules is the activities which are simple and operational.

In class –I the learners are familiarized with living and non- living things around them, which is not in the present curriculum through activities on observation.

In class – II the basic necessities of learners are to be identified which is not in the present curriculum. Apart from this awareness on the ways of water becoming dirty in their school, and measures to prevent it are also given.

In class – III the pupils are made to recognize the various sources of water, nature of water in these sources, its use, and consequences of lack of seasonal rains along with their level activity. In this class itself the pupils are also given an awareness of how rain water is contaminated on its way to rivers, ponds, lakes etc. along with some activities.

In class IV the pupils are given knowledge of impurities, mode of contamination in the different sources of water and how to prevent this contamination, the ways of purification of water, and about the protected water supply scheme.

In class V the water cycle, its process, and different aspects are introduced.

In class VI, domestic water management and rainwater management are given a place.

Domestic water management includes identification of amount of use of water for various purposes, scope for water saving, disposal of wastewater, water conservation at home, and soak pit.

Rainwater management includes, necessity of percolation pit and preparation of it.

In class VII, the nature of hard water, the way of softening it, process of purification of water, and steps in supply of pure water in township are included.

In class VIII, the content covers the different types of water borne diseases, their symptoms, and their transmission and preventive measures.

In class IX, content includes knowledge of fresh water and marine water habitats, the ways of their pollution and the consequences, and various factors that influences the life of its organisms.

In class X the content covers, the importance of water management in domestic and agricultural sectors, different methods of management, through different activities like dramatization, puppet shows etc.

Development of Modules

The content matter on water in the textbook was primarily analyzed and divided into graded material from class I to X. Concentric method was its guideline. Content was from simple to complex and activity oriented. “Check your progress” in self-evaluatory mode activity was introduced.

Conclusion

Environmental awareness is the most crucial concern for the human well-being. The human well-being is dependent on the healthy status of the natural resources without which the life of the humans is at stake. It is time for us to think seriously about the affects needed to bring back the original balance in the environment. Ecology, environment and the human beings have to co-exist with healthy relationships among them. Development of interest, values and attitudes towards the environment formative stage is of vital significance. Hence, environmental education is the corner stone of environmental awareness. It is given utmost priority even on the international platforms. Special committees are formed and so many conferences are held both globally and locally for its conservation and enrichment. As the future citizens are developed in the classrooms, awareness about environment among the developing children at school stage is thought of as being very significant.

The study helps the curriculum planners to know the extent of contents on environmental education in school syllabus and throws light on what else can be included in it. The suggested modules by the researcher on 'Water' component ranging from I to X class would supplement to deepen the knowledge, and sense to deal with other components of the environment in a systematic and graded manner.

Let us save water to enrich water resources and safe guard the welfare of tomorrow's society.

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STRETCHING OUT IN ALL DIRECTIONS TO REACH THE LEARNER

** Dr. K. Thejovathi*

In the changing context, when the frontiers of the countries are fast disappearing and education for all is aimed, at the teacher has to be dynamic in playing his multifaceted role. He is to reach the first generation learners on one hand and learners of different backgrounds on the other hand. Moreover he is to cater the multidimensional development of the learners.

Gone are the days when teaching was aimed at imparting 3 R's - Reading, Writing and Doing Arithmetic. Or for that matter even 7 R's - Recreation, Social Relations, Rights and Responsibilities. In the changing context, when the boundaries between the countries are fast disappearing teaching has become learner-centered. Many people say that at present most of the schools are actually commercial and their aim is simply make the students cram what they give in the form of notes and reproduce it on paper in the exams.

But the new slogan i.e. "Teaching is reaching" is an ideal one and very appropriate to the Indian schools especially where 60% of the learners are first generation learners who can learn better in regional language as the medium of instruction. Most of the pupils come from uneducated families. They do not have adequate educative environment at home. The parents depend on private tuitions, even to guide a first class student, in spite of their meager income.

Objectives

To propose the necessary concerns of the teacher :

1. to reach the learners of different backgrounds.
2. to develop necessary skills to meet the global changes.
3. to provide for the development of the multiple dimensions of the learner.

Reach the varied Learners

All educationists accept that the aim of education should be the total development of the child, which includes physical, mental, emotional, social, cultural, moral and spiritual development. These aspects should not be simply touched but teaching has to be reached because there is a difference between touching and reaching. Teaching can happen at the surface level but reaching has a deeper meaning. The dictionary meaning of 'reaching' is 'stretching out' i.e. the teacher has to stretch out his teaching so that it tries to develop all these aspects of the child. This reaching or

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stretching out is very important for the child who comes from an impoverished home environment or an inadequate educative environment.

For these children the teacher has to become a substitute parent and the school a second home. It requires a sympathetic understanding of the child's background, the lack of adequate linguistic, home and social environment which facilitate the learning process. In one of the recent studies supervised by the author, motivation served as a driving force, a very powerful force, surpassing the parents' education, occupation, economic and social status to overcome all the deficiencies. So the teacher who wants to reach the student has to make use of this 'mantra' with patience, sympathetic understanding, love and positive approach.

The way of Development

The physical development of the student can be achieved by providing games, sports, yoga etc., the mental or intellectual development by encouraging participatory learning and by providing books, magazines, newspapers and by paying extra attention to the children. For the emotional, cultural and social development of these children who come from culturally deprived families, co-curricular activities, cultural clubs, scouting; N.C.C., N.S.S., etc. serve a good purpose. Though their physical needs are met their social and psychological needs like attention, approval, appreciation, etc. are often neglected, and these have to be taken care of. So teaching should be reaching the children of different backgrounds with a sympathetic understanding and a positive approach of their needs.

There is a real explosion of knowledge. The technical and scientific advancement in the world is making not only the frontiers of the countries disappear but its influence is making even the foundries of the earth disappear. In this context teacher can't neglect this advancement. The teacher ought to keep abreast of this aspect and develop the necessary skills to face and to adjust to this context like communication, decision making, tension release etc. So teaching has to encompass these skills, but we can say only a few schools are paying attention to these skills. Of course in a highly competitive world the concentration should be on occupational, or vocational or bread-winning skills but it doesn't mean, that the necessary accessories for success in profession are unnecessary.

Need of the Day

The most important aims of education, namely the moral and spiritual, are unfortunately being neglected both in highly paid schools and also in the aided schools where medium of instruction is regional language and where most of the first generation learners get admitted.

The warnings issued by the great people like "science without humanity is dangerous",

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and “Education with out character is useless”, cannot be ignored, because total development of the individual is impossible if education ignores aspects like honesty, sincerity, sympathy non – violence and service to the mankind.

In actuality moral and spiritual values go hand in hand. If you follow the saying in the Bible “Love thy neighbor as thy self”, or the Islamic principles like Daya, Dana, Upavas etc. or the Hindu Upanishaths which say one who considers all other women as his own mother, who does not aspire for other women, for others money and who treats all the creatures as his equals, he has nothing else to learn or the call of Lord Krishna in his song celestial “Do your duty without bothering about the benefits”, whatever the religion is they all are moral values and serve as stepping stones to spiritual aspect of self realization. As the mantrapushpam (the chanting at the end of all Hindu religious rituals) says viswa purusha with thousands of heads, thousands of eyes and unless we see in every human being God and realize and develop the attitude that service to the suffering mankind is service to God education cannot be considered complete.

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SCIENCE PROCESS SKILLS OF IX CLASS PUPILS

Dr. Vanaja. M*

Science is both a body of knowledge and the process of acquiring it. The accumulated and systematized body of knowledge - which is the product of science - has a dynamic counter part, the scientific attitudes and methods of inquiry - which is the 'process' of science. Thus science is a combination of both 'process' and 'products' related to and dependent upon each other. The modern understanding of science includes an understanding of the science concepts, processes of science and the application of science in life situation. The present paper presents a study that assessed the acquisition of various science process skills among IX class pupils. The stated science process skills consists of the ability to perform the following basic process of scientific investigations like observation, comparing, classifying, quantifying, measuring, experimenting, inferring and predicting.

Introduction

Science has helped man to acquire supremacy over nature. It has greatly affected the way people view themselves and the world around them. The wonderful achievements of science have glorified the modern world and illuminated the creative human potential.

Science is viewed by a layman as a body of scientific information. To a scientist however, it is a method by which the hypotheses are tested. On the other hand, a philosopher would view science as a way of investigation and a way of thinking in the pursuit of understanding of nature. Science is conceptualised as :

- ❖ a body of knowledge.
- ❖ a method of inquiry, a way of investigation.
- ❖ an attitude towards life, a way of thinking.

Science education in the 21st century must be oriented to meet the challenges of covering the entire population in promoting scientific literacy. The principal goal of science education is to "create men who are capable of thinking for themselves". It is the inherent nature of children to learn and to go on learning on their own endlessly. It is also an innate part of the human mind to

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identify, name, order, compare, control, construct, demonstrate, state and apply a rule and finally consolidate them into valuable concepts and it is through the science curriculum that they can be initiated and fostered in children.

The Kothari Commission (1964 - 66) said, "if you will teach content, then who will teach science"? It was opined by the Commission that science was just not content and felt that if the stress was shifted from content to process, then content would be automatically included, but much more meaningfully.

It is unfortunate that even today, in our schools science is usually taught by lecture or at the best by lecture - demonstration method. Children are seldom involved in scientific activities using their own hands. The current innovations in schools emphasise the processes of science, the ways in which scientists advance their knowledge and solve problems. Educationists recommend that science should be presented to the pupils in such a way that they conduct an inquiry into the nature of things as well as a body of information built by other people. It is a general practice, that process aspect is neglected and school science emphasises 'body of knowledge'.

One of the most important and pervasive goal of schooling is to teach students to think. Science contributes its unique skills with its emphasis on hypothesising, manipulating the physical world and reasoning from data.

1. Science Process Skills

The scientific method, scientific thinking and critical thinking have been terms used at various times to describe science skills and today the term "Science Process Skills" is used. Popularised by the curriculum project, Science - A Process Approach (SAPA), of the American Association for Advancement of Science, these skills are defined as a set of broadly transferable abilities, appropriate to many scientific disciplines and reflective of the behaviour of scientists. SAPA has grouped process skills into two types :

1. Basic science process skills : They are : i) observing, ii) measuring, iii) comparing, iv) communicating, v) classifying, vi) predicting, vii) using number and viii) inferring.
2. Integrated process skills : They are : i) controlling variables, ii) interpreting data, iii) defining operationally, iv) formulating hypothesis and v) experimenting.

The new school science programmes are now laying a significant emphasis on the understanding of the processes of science as a major objective of teaching science. Hence this study was undertaken to find out the extent to which science process skills have been developed in the IX class pupils. The study was confined to assessing the acquisition of eight science process skills and their relationship with achievement in science. The study was taken up in the field of general science and only eight process skills were assessed.

The operational definitions of the eight process skills chosen are :

- a) *Observing* : Skills identifying object property through observation.
- b) *Comparing* : Relating the characteristics of specific objects, similarities, differences or relationship among them.
- c) *Classifying* : Grouping various objects / concepts on the basis of similarities or differences in their characteristics.
- d) *Quantifying* : Computing the characteristics value of an item or converting one unit to another using simple computations and relations.
- e) *Inferring* : Reasoning out the possible cause of a particular observation or incident.
- f) *Predicting* : Analysing the given information and drawing out conclusions on its basis.
- g) *Measuring* : A number of derived measures applicable to specific physical and biological systems.
- h) *Experimenting* : It is developed through a continuation sequence for controlling variables using set procedures.

❖ **Research Questions**

Research Questions that were proposed to be answered through this study were :

1. Are science process skills developed in IX class pupils ?
2. If so, to what extent have these skills been developed in IX class pupils ?
3. What are the factors influencing development of science process skills ?

❖ **Objectives of the Study**

In order to find answers to research questions raised the following objectives were formulated:

Objective 1 : To assess the acquisition of science process skills of IX class pupils.

Objective 2 : To find out the correlation between the eight chosen science process skills.

Objective 3 : To find out the influence of some select variables like a) Gender, b) Medium of Instruction, c) Type of School, and d) Availability of science lab, on science process skills of IX class pupils.

❖ **Hypotheses of the Study**

In order to study the objectives formulated the hypotheses framed were :

Hypothesis 1 : There would be no significant difference between boys and girls with respect to their acquisition of science process skills.

Hypothesis 2 : There would be no significant difference between pupils studying in English and Telugu medium schools with respect to their acquisition of science process skills.

Hypothesis 3 : There would be no significant difference between pupils studying in government and private schools with respect to their acquisition of science process skills.

Hypothesis 4 : There would no significant difference between pupils studying in schools with science labs or without science labs with respect to their acquisition of science process skills.

❖ **Methodology of the Study**

The study adopted survey method. The population of the study consisted of all X class pupils studying in Repalle town of Andhra Pradesh. Of the 12 schools, 7 were selected, from which 200 students were drawn using random sampling technique. The tool used was an adapted version of the tool standardised by P. C. Bhatt, (1988). Out of the original 75 questions which contained varying number of each skill, the researcher chose 30 questions and developed 10 questions. Uniformity was maintained with regard to each skill by using 5 questions each ensuring two each, from Biology and Physics and one from Chemistry. Responses were scored and tabulated by awarding one mark for correct response and zero for wrong answer.

❖ **Data Analysis**

● **Overall Science Process Skills of the Whole Sample**

The data obtained with regard to the overall acquisition of science process skills is presented in Table 1 :

Table 1 : Whole Sample - Acquisition of Science Process Skills

| <i>N</i> | <i>Mean</i> | <i>% of</i> | <i>S.D.</i> | <i>Skewness</i> | <i>Kurtosis</i> |
|----------|-------------|-------------|-------------|-----------------|-----------------|
| 200 | 23.24 | 58.1 | 4.63 | 0 | 0.25 |

From the table, it can be seen that sample mean is average and normally distributed. It can be concluded that the acquisition of science process skills of pupils who have studied science for 8 - 9 years is not upto the desired level. This probably could be attributed to the chalk and talk method practiced by majority of our science teachers.

● **To assess the acquisition of science process skills process wise**

Table 2 presents the mean, % of mean and S.D. for each of the skills chosen in descending order.

| S. No. | Skill | Mean | % of Mean | S.D. |
|--------|---------------|------|-----------|------|
| 1. | Comparing | 4.15 | 89.46 | 1.08 |
| 2. | Observing | 3.57 | 71.4 | 1.02 |
| 3. | Predicting | 3.34 | 66.8 | 1.23 |
| 4. | Measuring | 3.13 | 62.6 | 0.95 |
| 5. | Quantifying | 3.12 | 62.4 | 1.2 |
| 6. | Inferring | 5.01 | 60.3 | 1.00 |
| 7. | Experimenting | 2.8 | 56.0 | 1.06 |
| 8. | Classifying | 2.11 | 42.2 | 1.41 |

From the Table 2 it can be seen that students are very good at comparing and observing, moderately good at predicting, measuring, quantifying and inferring and poor in experimenting and classifying. The present study also found students with good observation but poor classifying skills. This surprising result calls for an in-depth study as to why the skill was not developed. In contrast Bhatt (1983) found highest mean for skill measuring followed by comparing, observing, quantifying and classifying and relatively low means for inferring, predicting and experimenting.

● **Correlation between the Eight Process Skills**

Table 3 shows the correlation matrix between the eight science process skills.

Table 3. Correlation Matrix between Eight Science Process Skills

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|--------------------|--------------------|---------------------|---------------------|---------------------|--------------------|---------------------|--------------------|
| 1 | | 0.25** | 0.26** | 0.21** | 0.14* | 0.17* | 0.08 ^{NS} | 0.22** |
| 2 | 0.25** | | 0.205** | 0.06 ^{NS} | 0.11* | 0.14* | 0.03 ^{NS} | 0.09 ^{NS} |
| 3 | 0.26** | 0.20** | | 0.318** | 0.12 ^{NS} | 0.11 ^{NS} | -0.02 ^{NS} | 0.253** |
| 4 | 0.21** | 0.06 ^{NS} | 0.31** | | 0.122 ^{NS} | 0.16* | 0.09 ^{NS} | 0.44** |
| 5 | 0.144* | 0.11 ^{NS} | 0.129 ^{NS} | 0.122 ^{NS} | | 0.09 ^{NS} | 0.349** | 0.174* |
| 6 | 0.178* | 0.140* | 0.113 ^{NS} | 0.160* | 0.09 ^{NS} | | 0.118 ^{NS} | 0.259** |
| 7 | 0.08 ^{NS} | 0.03 ^{NS} | -0.02 ^{NS} | 0.09 ^{NS} | 0.118 ^{NS} | 0.349* | | 0.25** |
| 8 | 0.22* | 0.09 ^{NS} | 0.25** | 0.44* | 0.17* | 0.25* | 0.25** | |

(** : Significant at 0.01 level, * : Significant at 0.05 level, NS : Not Significant at 0.05 level)

From table 3 it can be seen that negative correlation is exhibited only between classifying and inferring. The rest of the correlations are positive and range from 0.03 to 0.44.

Bhatt, P. C. (1983) in his study found that the correlation matrix had predominantly positive correlation, which indicates positive loading for nearly all variables on the first principle component factor - G factor. In the present study also there is a positive correlation among all the eight process skills, only exception being the negative correlation between classification and inferring. The processes of science are interrelated and this study has to some extent validated it. Observation skill is the basis for any scientific activity and hence it is positively correlated with all the other skills. The skill of measuring is not significantly correlated with five skills and correlated with observing and predicting skills and this could probably be due to the lack of hands on experience for students. Inferring as a skill requires higher order thinking and the available data shows that it is not correlated with lower order skills.

❖ **Influence of selected variables on Acquisition of Science Process Skills**

Table 4 presents data with regard to the chosen variables i.e. gender, medium of instruction, type of school and availability of science lab in school.

Table 4 : Influence of Variables on Acquisition of Science Process Skills

| <i>S.No.</i> | <i>Variable</i> | <i>Sample Description</i> | <i>N</i> | <i>Mean</i> | <i>% of Mean</i> | <i>S.D.</i> | <i>S_{ED}</i> | <i>t</i> |
|--------------|---------------------------------------|---------------------------|----------|-------------|------------------|-------------|-----------------------|--------------------|
| 1. | Gender | Boys | 100 | 21.7 | 54.25 | 4.56 | 0.38 | 4.99** |
| | | Girls | 100 | 24.79 | 61.79 | 4.18 | | |
| 2. | Medium of Instruction | English | 100 | 22.59 | 56.47 | 3.97 | 0.64 | 2.03* |
| | | Telugu | 100 | 23.91 | 59.77 | 5.13 | | |
| 3. | Type of School | Govt. | 100 | 22.64 | 56.6 | 4.008 | 0.65 | 1.88 ^{NS} |
| | | Private | 100 | 23.87 | 59.67 | 5.12 | | |
| 4. | Availability of Science Lab in school | No Lab | 91 | 21.52 | 53.8 | 3.96 | 0.611 | 5.122** |
| | | Lab available | 109 | 24.66 | 61.65 | 4.68 | | |

(** : Significant at 0.01 level, * : Significant at 0.05 level, NS : Not Significant at 0.05 level)

Table 4 presents some interesting observations. Girls have acquired better process skills than boys and the mean difference between them is significant. The medium of instruction and type of school don't seem to be influencing the samples acquisition of science process skills. The availability of science lab as expected has had a significant influence on the acquisition of science process skills.

Bhargava, (1983) reported in his study that boys were found to be superior to girls on

processes of observing, measuring and drawing. Bhatt (1983) found that boys had a better understanding of science process skills than girls. In contrast in the present study IX class girls have acquired better science process skills than boys. It is a generally observed trend that girls evince a keen interest in science and are more curious than boys. The present trend may be attributed to the interest, motivation, attitude towards science of girls.

Bhatt, (1980) found that private school students have a better understanding of science process skills and the present study found a similar trend. In Government schools due to lack of infrastructure, students are not able to acquire practical skills.

This study has also established the fact that availability of laboratories leads to better understanding and development of science process skills. The existence of laboratories and availability of equipment has a definite influence on the choice of method. Even if students do not get an opportunity to work individually in the science lab, they would atleast be exposed to demonstrations of teachers.

❖ Hypothesis Testing

Table 4 presents the details of the Statistics of Hypothesis Testing and Interpretation.

Table 5 : Hypothesis Testing

| S. No. | Hypothesis | Variable | 't' value | Level of Significant of df |
|--------|--|-------------------|----------------------|---|
| 1. | There would be no significant difference between boys and girls with respect to their acquisition of science process skills. | Boys Girls | t=4.99** | Significant at both 0.05 and 0.01 level df = 198 |
| 2. | There would be no significant difference between pupils studying in English and Telugu medium schools with respect to their acquisition of science process skills. | English Telugu | t=2.03* | Significant at 0.05 level df = 198 |
| 3. | There would be no significant difference between pupils studying in Government and Private schools with respect to their acquisition of science process skills. | Govt. Private | t=1.88 ^{NS} | Not significant at both 0.05 and 0.01 level df = 198 |
| 4. | There would no significant difference between pupils studying in schools with science labs or those without with respect to their acquisition of science process skills. | No lab Yes lab | t=5.122** | Significant at both 0.05 and 0.01 level df = 198 |

❖ **Findings of the Study**

1. The mean, % of mean and S.D. for the acquisition of science process skills of the whole sample are 23.24, 58 and 4.63 respectively. The Skewness and Kurtosis for the whole sample are 0 and 0.25.
2. The obtained percentage of mean in descending order are Comparing (89.46), Observation (71.4), Predicting (66.8), Measuring (62.6), Quantifying (62.4), Inferring (60.3), Experimenting (56) and Classifying (42.2).
3. A negative correlation of -0.02 was found between classifying and inferring skills. The rest of the correlations are positive, ranging from 0.03 to 0.44 and an appreciable significant correlation was found between quantifying and predicting (0.44) and experimenting and inferring (0.35).
4. The mean, % of mean, acquisition of science process skill scores for boys and girls are 21.7 and 54.25, 24.79 and 61.97 respectively. The 't' value for mean difference between boys and girls on their acquisition of science process skills is 4.99 which is significant at 0.01 level.
5. The mean and % of mean of science process skill scores of English and Telugu medium school pupils are 22.59 and 56.47, and 23.91 and 59.77 respectively.
6. The mean and % of mean of science process skills scores of Government and Private school pupils are 22.64 and 56.6 and 23.87 and 59.67 respectively. It can be concluded that the type of school is not influencing the acquisition of science process skills.
7. The % of mean of acquisition of science process skills of pupils studying in schools with lab facilities and those without are 64.65 and 53.8 respectively and 't' value for testing significance of mean difference is 5.12.

❖ **Conclusions of the Study**

1. The acquisition of science process skills of IX class pupils is moderate and normally distributed.
2. A large percentage of pupils are able to compare and observe, a good percentage are able to predict, quantify and infer, and a relatively small percent are able to experiment and classify.
3. Girls have better science process skills than boys and gender is an influencing factor on the acquisition of science process skills.
4. The medium of instruction is not an influencing factor on acquisition of science process skills.
5. Availability of science lab helps in the development of science process skills.

Educational Implications

There has been a paradigm shift in education from teaching to learning. Till recent past, the emphasis in science teaching had been on giving expansive information in the form of scientific facts, concepts and principles, but today emphasis is on 'learning how to learn'. Hence our

classroom science instruction should provide avenues for processing of information rather than providing it. It is time every teacher remembered this maxim "I hear and I forget, I see and I remember, I do and I understand".

The present study hints at a hierarchy of processes from concrete and specific skills like observing, comparing and classifying to abstract and general skills of inferring and predicting, with quantifying, measuring and experimenting in between. This calls for a revamping and redesigning of an integrated science programme in our schools.

There is no universal agreement regarding the direction in which science instruction has to progress. Science has been regarded as study of nature, of technology, and of the processes of scientific investigation. The fundamental purpose of our school education can be regarded as transmission of culture, accumulated but constantly changing knowledge, skills, and values to the youth of the society. Science is included, principally, because it forms a large and influential part of our culture. In the nineteenth century, religion was the dominant factor and society demanded the inculcation of moral values. The science curriculum at that time was need based. When society needed a reaction against industrialization, the science curriculum stressed emotional and aesthetic goals. The depression of 1930's called upon the schools to teach practical knowledge and the science curriculum emphasis shifted to teaching socially useful skills. Today, society demands a knowledge of the environmental pollution, hazards of industrialization, the population explosion, etc., and the science curriculum aims to fulfil them.

Thus the minimum result of a science course should be to develop a rational world in which mankind has confidence. Science teaching is not a set of instructions that will help the pupil to commit results to mind, rather, it should teach him to participate in the process that makes possible the establishment of knowledge. The resultant of science teaching should not be a living library of facts. Science teaching should no doubt expose students to a body of knowledge produced, but in addition, it should provide the experience of generating that knowledge.

If we teach science through process approach, it automatically becomes activity based. If a child learns science through process approach, he learns a lot of science on his own. Thus Process Approach is one of the best ways of teaching science, as it motivates the children, and they get involved in doing activities. Certain competencies are to be developed in children while teaching science, like spirit of inquiry, objectivity, courage to question, problem solving, decision making, investigating, developing scientific attitude or temper, reducing all sorts of prejudices based on sex, caste, religion, language etc. and process approach can make this possible. Although one has to devote more time while teaching science through process approach, in the long run, teaching - learning process becomes more interesting and effective. The end result is that science teaching and learning would be fun.

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DEVELOPING COMPETENCY IN TEACHING OF ENGLISH IN THE PROSPECTIVE ENGLISH TEACHERS

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This paper throws light on the present condition of prospective teachers in teaching of English. It analyses the need for the development of competency in teaching of English in the prospective English teachers. It suggests some strategies to develop the communicative abilities and competency in teaching of English in them.

Introduction

Of all the languages in the world today, English deserves to be regarded as a World language. It is the world's most widely spoken language. One person out of every four on the earth can be reached through English. It is true that English is the mother tongue of people of Great Britain, America, Canada and Australia. But there are many people who can communicate well in English through out the world. English is the medium of instruction as well as the language of government and administration in a number of Asian and African countries.

Today the compulsions of learning English are no longer merely political but are also scientific and technological. English remains primarily the medium of learning for everything from English literature to Science and Technology. It plays an indispensable and inextricable role in communication among the people of a country like India inspite of its distinctive religions, diverse cultures and different languages.

It is felt that English is to be taught principally as a language of comprehension rather than as a literary language. Most of our students need only a functional or working knowledge of English to comprehend books written in the language and to express themselves clearly in English. For this purpose they need not read English literature as its function is somewhat different from that of knowing the language.

The All India Seminar on the Teaching of English in Secondary Schools recommended that its aim should be to enable pupils to learn, understand, speak, read, and write the English language. The pupils should be enabled to gain a working knowledge of English, giving them mastery of more than 250 basic structures and a vocabulary of atleast 2,500 words.

Thus, learning English from a utilitarian point of view implies the acquisition of four basic skills:

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1. to understand English when spoken; (Listening comprehension)
2. to speak correct English; (Speech ability)
3. to understand written English (Reading) and
4. to write correct English (Writing ability).

Now we come to the question, 'What is the teacher's role?'

The Teacher's Role

The teacher's role is to develop in his pupils a practical command over English, mainly stressing the communicative skills. But has the teacher got a reasonable command of English and adequate 'goods' to deliver to his pupils in the classroom? If not, why?

As Robert Lado says, "The language teacher must be educated at least to the levels of his peers."

According to Kohli, "The teacher occupies a pivotal position in education. It is important that we have the right type of English teacher. The teacher's language is the principal model for the student. The teacher should be fully equipped to do justice to the subject. He should be painstaking and patient, for, an impatient teacher cannot teach English. He should continue to improve his efficiency." Hence, the teachers in the making should equip themselves fully with the required mastery of skills of the language.

Analysis of the Present Situation

In India the main problem is to have competent teachers of English. A large number of the present teachers are relatively ill-taught and noted for their lack of professional skill in their understanding of language and language learning, and in their command of methods and techniques of language teaching.

Wilkins is right when he observes: "It should be unrealistic to expect a teacher to set objectives which he himself is not capable of reaching." A teacher who himself has difficulty in speaking the language he teaches, is not going to succeed in giving his pupils a command of spoken language.

It is now important for the teacher to equip the learner with the command of English which allows him to express himself in speech or in writing in a much greater variety of contents. What is required is that we in India should lay greater emphasis on the communication needs of our students, the nation builders of the society, in the global economy, while teaching them English as a second language.

The graduates from English and vernacular media background enter the portals of the Colleges of Education together. Most of them aspire to take English as one of their methodology subjects. But they suffer from lack of a sound foundation of English. They are not fluent in the language and the four basic skills are not developed. They are also very poor in communication.

How do we make them competent in teaching English ?

Now, the burden lies on the shoulders of the faculty members in the Colleges of Education to prepare English language teachers who are good and well equipped with the skills of teaching the language.

To achieve this aim, the faculty members have to attain two main objectives :

1. to develop the communicative abilities and
2. to develop competency in teaching of English in the teacher trainees.

I. Developing the Communicative Abilities

The teacher educator has to plan for a number of activities to achieve the goal he/she has set before himself / herself. Language is learnt much when put to use. The activities will make the learners use the language unconsciously, along with their peers. The activities have to be done regularly. The following activities are suggested to improve their communication. They are :

1. listening to the speeches, news on Radio and T.V and bringing out the salient features;
2. watching the English films, documentaries, programmes etc. and analyzing them critically;
3. describing an object, picture, personalities, personal experiences, processes etc.;
4. narrating a situation, stories, providing outlines;
5. playing language games like just a minute, yes or no type questions, one word substitution, describe and draw, acting, miming etc.;
6. interviewing the peer groups;
7. giving directions and instructions;
8. brainstorming the students;
9. preparing and delivering a speech;
10. developing the art of questioning in different ways;
11. pair work and role-play;
12. organizing quiz, debates, seminars, workshops and group discussions on films, plays and books;
13. developing the habit of reading dictionary, thesaurus and encyclopedia and improving note-making and note-taking ;
14. maintaining 'MY WORD BOOK', their own dictionaries ;
15. reading newspapers, articles in journals and magazines every day and assessing them critically;
16. summarizing a text, article etc.;
17. writing dialogues, letters to the editor, officials etc.;
18. writing articles, stories, advertisements, captions, reviews and creative writing;

19. making them think and frame concepts only in English and
20. strictly using the English language as much as possible in all situations.

These activities could be taken up every day to help the teacher trainees to develop better communication.

II. Developing Competency in the Teaching of English

The teacher educator has to make the teacher trainees use the English language in the classroom and on the campus as a habit as constant use enables them to be confident. When the teacher educator speaks to them only in English and does not use the vernacular language, it brings a change in them and makes them use English.

As Willis (1981) says, "Teaching English through English, making only judicious use of mother tongue, is another way to promote the chances of learning English. Initially, this may be unpalatable for the teacher and the learners. However, as time passes by, they will find themselves at home with it."

Teaching English in our classrooms is governed by formally prescribed syllabus and textbooks to provide input for instruction. Textbook is the guideline or framework. Every teacher should go through the text thoroughly before he or she enters the class for teaching English.

Methodology includes the various methods and techniques of teaching. Teacher trainees are to be given much practice in Direct and Bilingual methods and use of different techniques. The teaching starts with motivation. It is the most important element for learning. This can be done using various techniques like pictures, objects, match stick figures, verbal illustrations etc. Enable them to show variety in their teaching everyday and make the class interesting.

K.S. Joseph gives some hints to teachers to facilitate teaching of English

- “— use visual aids and realia wherever possible
- repeat and paraphrase materials and patterns as often as possible so as to provide opportunity for learners to process them.
- speak clearly and slowly with due emphasis on stress and intonation.
- use gestures and expressions while giving instructions.
- resort to such techniques as demonstration, miming, and acting
- use language forms that fall within linguistic repertoire of the learners
- and bring in as many examples as possible.”

The evaluation procedures should enable the teacher trainees develop the skill of asking questions on comprehension. These suggestions will help to make the teacher trainees better and competent teachers.

Conclusion

It is the responsibility of the teacher educators to carve the competency of prospective English teachers. The strategies mentioned will help to develop the communicative abilities and efficiency in teaching. The teacher trainees will walk out of the colleges with confidence to enrich the younger world who will rule the global village.

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CAN AN EDUCATOR BE BOTH A TEACHER AND A LEARNER?

*Sr. Santha**

The significance of a teacher is affirmed in Sant Kabir's couplet: "If God and Teacher, both are standing in front of me, I will pay my respects first to the teacher, who led me to God." Teaching is like lighting a lamp, that lamp lit by a teacher may burn brighter than its source.

The teacher facilitates the intellectual, emotional, moral and social development of his students and builds their character. He plays an important role in the society and the lives of his students. According to J. Krishnamurthi, Education is not merely teaching about academic subjects but even facilitating the natural flowering of the child. Teacher is to help the students to discover what he is interested in and choose the best position according to his ability and willingness, so that he may shine in his life.

The teacher succeeds by being a highly useful member of the society. His usefulness sustains and recreates the higher values that a society must cherish in order to remain in the vanguard of progress. The true educator is the one who shows the way to wisdom and truth. In Jiddu Krishnamurthi's view "The right kind of education begins with the educator." The nature of the teacher, his relations and his development appears to be crucial in the field of education.

Objective of the Study

- ❖ To identify what the teacher is to be in relation to the student.
- ❖ To establish the necessity for teacher development.
- ❖ To identify the obstacles in meeting the student needs.

Methodological Procedure

An analysis of the content of Jiddu Krishnamurthi's book on "Education and the Significance of life."

Content Area

Sample includes the titles: The right kind of education, Intellect, authority and Intelligence, Education and world peace, The School, parents and Teachers, of the book "Education and the significance of Life."

Analysis and Discussion

"Life is relationship", according to J. Krishnamurti. Education is to prepare the learners for life. Relationship with another human being is one of the most important things in life. Without a relationship, one cannot exist.

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Krishnamurthi exposes the nature of relationship saying, "A relation is not a static affair, but a living movement and so it is never the same." Relationship requires a great deal of understanding with intelligence. It cannot be bought in a book or be taught. So it becomes very important for the educator to feel responsible in his personal relationship, not only the students but also the whole of mankind. The relationship between the teacher and the student has the element of companionship of mutual understanding, humility, sensitivity, and freedom. Understanding others can be very well facilitated by understanding oneself. Whether we belong to an organized religion or not, whether we are wordly or caught up in ideals, our suffering can be resolved only through the understanding of ourselves in relationship. All relationships should be mutual.

The teacher himself must first begin to see himself, intensely aware of his own thoughts and feelings, aware of the ways in which he is conditioned, aware of his activities and his responses, for out of this watchfulness comes intelligence, and with it, a radical transformation in his relationship to people and to things may be possible. A teacher is as conditioned as the students though their conditioning may vary. It is still a conditioning. Such a self-knowing on the part of the teacher may be inculcated in the learners too, with which the learner also can explore his own thoughts and feelings and be free of inward confusion. So the primary responsibility of the teacher is to build a relationship between himself and the students and not their memories.

Teacher - To Be

Teachers are not meant only to impart knowledge, they also have to reach out to different levels of the students. Educators' function is to help the student to learn not this or that subject only, but to understand the whole activity of learning. The strength and certainty of the teacher give assurance to the student. The potentialities of the teacher certainly reflects in his teachings. M.K. Gandhi felt that "the true textbook for the pupil is his teacher." When the teacher understands the whole nature of learning, pupil get a great facilitating environment through him. His responsibility as an educator becomes more and more serious, more and more committed, and more and more concerned with the education of his students.

One is quite sure that the educators are aware what is actually happening in the world. Krishnamurthi says "We are highly intellectual, we have developed cunning minds, and are caught up in explanations". In order to create a good new society, each one of us has to be a true teacher, which means that we have to educate ourselves. Educator has to help the student to find out his relationship with the world, the world not of imagination or romantic sentimentality but to the actual world in which all things are taking place.

As of today, the learner is unable to take the criticism from any corner of life. Hence

the educator is to help the learner, the art of living. It means he can help the learner understand the right and wrong side of life and carry on with only what is right. It, then, happens not only while he is part of the school but through out his life. Right education is a mutual task which demands patience, consideration and affection.

“Right values can be discovered through individual thoughtfulness.” When an educator understands this deeply, he will encourage the student, from the very beginning to awaken an insight, into the present day individual as well as social values. Educator should feel very strongly about the future of these students and help them to use intelligence and love. Educator teaches the child to encourage him to find his true vocation by helping him to discover his capacities, interests and attitudes towards the vocation. Then he will put to use all his potentialities confidently with creativity and conviction. One teaches because one wants the child to be rich inwardly, which will result in his giving right value to possessions.

The educator has to be aware of the implications and the full significance of freedom to the child. So that child may grow in integration and understand the value of education. The secondary education commission observes that discipline, mostly depends on teachers because children spend their time mostly in school. Teachers with their kindness and love surely develop innate discipline in learners.

The educator must develop the feeling of security in children. . . This feeling increases the learning capacity in the child. A sympathetic teacher is sure to win the hearts of his pupils. Quite a large number of troubles arise due to the harsh and unsympathetic behaviour of the authorities towards the child. This must be properly understood and tackled well at the right moment.

Obstacles to be Cared For

The function of education is to eliminate fear because it destroys the nature of relationship between human beings. Fear kills the creative power in students and their inner abilities are ruined. First the educator should develop a direct relationship in order to eradicate fear in the child. He should discuss with the students about the whole nature and structure of fear. He should teach how to face the fact of fear without suppressing it.

J. Krishnamurti says “the authority of comparison destroys the child’s capacities. When one student is compared to another both are being hurt”. All authoritarian attitude destroys intelligence. Teacher must be aware that every child is unique and he must take an active role to develop his inner abilities without any comparison. The teacher should never compare two children, each child is an individual and has his unique personality and characteristic beauty.

It is the function of the true teacher to instruct, point out, inform, discuss without the corrupting influence of authority, to live without comparisons to have integrity. When the teacher observes this, the taught flourishes like a flower in goodness and grows into a human being.

Relevance for the Teacher and Taught

- ❖ Integrity of the teacher only is found to help in integrated development of the learners.
- ❖ Total development is found possible in self-knowing on the part of the teacher which can also be inculcated in the learners.
- ❖ Teacher is to look into his own thoughts, feelings and responses and all his conditioned activities not to attach to them but to be free of them.
- ❖ The relationship between the teacher and the student should be dynamic and not static with elements of humility, sensitivity, affection and mutual understanding in freedom.
- ❖ Teacher can be both the educator and the learner.
- ❖ Teacher and student together are to discover the right values in the present day society.
- ❖ Kind and loving direction of the teacher can develop self discipline among learners.
- ❖ The teacher and learner together explore the rational and irrational fears in them to get rid of the irrational because the feeling of security increases their learning capacity.
- ❖ The teacher is to be cautiously aware that authoritarian attitude and comparison destroys the uniqueness of personality.

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ENRICHING Skill DEVELOPMENT in PROSPECTIVE TEACHERS

** J. Vijayakumari*

Teachers of tomorrow are to be moulded by equipping them with knowledge, developing various skills, and exposing them to the practice of various modes of teaching-learning activities. The teacher-education programme is to sensitize the student-teachers to exercise and improve their capabilities to face the challenges of education. The prospective teachers, hence, are to be trained in this direction.

School plays a crucial role in shaping the individuals into physically strong, mentally alert, emotionally stable, culturally sound, and socially efficient citizens. The development of all these aspects of the child in the school is the responsibility of the teacher.

In this modern age, the educational scenario demands the teacher to play a multi-dimensional role. For this, we need well-equipped and qualified teachers, as, they are the major contributors for the all round development of the children. John Adams expressed that “TEACHER IS THE MAKER OF A MAN”. So, a prospective teacher should develop not only the necessary knowledge and skills but also develop the psycho - social behaviours to meet this demand.

As Albert Camus says “Ships are safe in the harbour, but they are not built for that purpose”. Hence, future teachers are not only to impart knowledge, but also to reach out to the different levels of the students. In addition, a teacher has to make teaching lively and informative.

Objectives of Skill Development

1. To raise the standards of teaching.
2. To emphasize the importance of the application of appropriate teaching methods.
3. To have better behavioural interactions with the learner, fellow-teacher, higher authorities, parents, and the society.
4. To develop interest and involve the student – teachers in all the activities with a missionary zeal.
5. To prepare the student teachers to strive for quality in education.

Strategies for Enrichment

1. With regard to their respective methodologies, tests based on the content of the school subjects concerned are to be conducted at the beginning of the course to test their knowledge, so that, the prospective teachers become aware of the knowledge they have and get ready to equip further.

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2. Most important of all, for a prospective teacher is her own concept clarity. For this special provision is to be given in the time-table for library work to enrich her knowledge.
3. Self-learning which promotes her total involvement and builds articulative skills to lay the foundation for life-long learning is to be encouraged.
4. Exposure of the student-teachers to individualized efforts is to be given priority in the preparation of assignments and presentation of seminar papers.
5. Immediate feedback related to performance in teaching and in preparing of teaching aids, is to be given to improve and strengthen their efforts.
6. Innovative preparation of audio-visual aids of no-cost and low-cost is to be encouraged.
7. Various teaching methods are to be practiced to teach effectively under the close supervision of teacher-educators. Flexible micro and macro-teaching schedules should be planned and executed to make them realize the advantages and limitations of each of the methods.
8. The primary spirit of the methodology subjects is to promote 'effective teaching' both in the practice teaching and in the internship programme.

Skills to be Developed for Better Interaction

Daily Assembly is the right platform to develop communication skills viz., addressing the gathering with news-reading, thought for the day, welcoming, thanking the guest etc. By adopting innovative ideas like 'Talk your way', 'Just a minute' improve their capacities to open up their ideas.

Exposure to certain current events and programmes of concern like AIDS, child labour, human rights, small family norm, illiteracy etc.; should be a regular practice that helps in the development of empathy and interactive skills while working with the NGOs and officers of different fields.

To promote community consciousness in the student-teachers, the college should conduct programmes which include adoption of minority and social welfare schools. Through this, the student teachers may be given the opportunity to meet the children of different social backgrounds. By holding study-hours for them the student-teachers will be able to acquaint themselves with the problems of children and help them to cope with them and even solve them.

Formation of various clubs, for Education, Literary, Cultural, Environment issues etc. by the student-teachers would gear them up in a mutual exchange of ideas. Apart from the curricular activities, the Citizenship Training Camp be conducted to develop democratic and civic traits in the student-teachers. In addition to these, managerial and group-behavioural skills too may be developed.

Through Guidance and Counselling, the teacher-educator can assist the prospective teachers to take right decisions at the right time in the educational programmes and personal endeavours.

Involvement of Student-teachers for Holistic Development

Workshops on preparation of better teaching/learning materials be organized at regular intervals. Evaluation of television lessons by student-teachers in all methodology subjects under the supervision of the teacher - educators not only provides an exposure to good teaching but also promotes critical thinking. A regular programme of games, sports, preparation of socially useful productive items and co-curricular activities that enable them to participate in the activities of their interest are to be planned.

Festivals of religious, national, and international importance are to be celebrated to promote the feeling of oneness and also preserve the rich cultural heritage of the country. Meditation and yoga, if followed regularly, can keep the body and mind in tune to be receptive to the varied activities and to equip oneself as a full-fledged teacher.

Conclusion

According to Adams, "A teacher affects eternity, one can never tell where his influence stops". Therefore, teacher being the integral part of the educational system should act as a pivot for the transmission of intellectual traditions, theoretical, and technical skills from generation to generation.

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EFFECTIVENESS OF VEDIC METHODS AND CONVENTIONAL METHODS ON THE ACQUISITION OF NUMERICAL ABILITY IN MATHEMATICS

*Dr. T. Swarupa Rani**

The main aim of presenting this article is i) To explain the principles of Vedic Mathematical Sutras and bring them within the easy intellectual reach of every seeker of mathematical knowledge. To bring to light. Vedic Mathematics which helps to reach the learner by simple rules, which enable to reduce fear and anxiety in the children, and makes them learn mathematics with joy, intense eagerness and develops curiosity to solve all kinds of Mathematical problems easily and efficiently. ii) To acquaint the reader with Vedic sutras and their applicability to different mathematical operations and problems, and to bring out in brief the research findings of some of the Vedic sutras experimented.

Why Vedic Mathematics

Mathematics is one of the most important areas of study which fulfils the aims of education in developing physical, intellectual, aesthetic, social, cultural, and spiritual aspects of the child. It also prepares the child to develop life skills, such as decision making, critical thinking, problem solving, and creative abilities. To cope with life and to develop life skills one needs sufficient knowledge and efficient use of mathematics. Effective management of numbers and operations will help to run life smoothly and effectively. Many virtues of life such as simplicity, accuracy, definiteness, originality, verification, concentration, power of expression, self reliance, attitude of discovery, quality of hardwork, and art of economic living are products of mathematical thinking. Mathematical abilities are very important and essential for effective adjustment to life situations.

In spite of all these positive manifestations, pupils express some negative feelings for mathematics. They think that mathematics is too abstract in its nature, remote from life interests, and taught completely on theoretical basis. They develop number and subject-phobia and are not very much interested to learn mathematics, resulting in many adverse effects, leaving individuals with fear of mathematics and anxiety in their minds. A child's mind with all these inhibiting complexes does not function creatively. In order to eliminate fear and anxiety in the children's minds there is a need to develop positive feelings towards maths. To create interest and exuberant love for maths there are several methods and techniques of learning, that eliminate fears and tears and

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facilitate learning to enjoy and to draw fruits of Mathematics. Vedic methods or techniques or sutras are important and they have considerable effect on mathematical applicability meeting these psychological liabilities with great success.

Vedic mathematics originated from the Vedas which manifested divine knowledge. The natural, easy, and superfast algorithms of Vedic mathematics brings an upsurge of joy and bliss. Owing to its very special and universal features, Vedic maths system converts dry and tedious maths into a playful and joyful study which children learn with a smile. So Vedic maths is the gift of the Vedas mathematical problem solving, without anxiety and fear.

What is Vedic Mathematics ?

Vedic Mathematics or ancient Indian mathematics is represented by 16 sulabha sutras and 13 sub sutras as presented by Jagadguru Sankaracharya, Sri Bharathi Krishna Thirtha Maharaj (1884 - 1960) of Govardhana Math, Puri. These sutras are taken from UpaVeda i.e., Veda Stapatya Veda of Adharvana Veda. These sixteen sutras help in solving the problems with greater ease. Sutra means a thread of knowledge. The English word 'Suture' comes from Sutra. The meaning of Suture is the thread, doctors use to stich wounds together. Mathematical Sutras are short and simple statements which give formulae for solving mathematical problems. All these sutras explain easy, short cut, simple, and alternate methods applicable and suitable to mathematical knowledge at all levels, enlarges into every branch from elementary stage to post graduate stage, and helps in solving exceedingly difficult mathematical problems with greater ease. These methods are very easy to understand, remember and apply and have been built on the 16 sutras and 13 subsutras.

To justify the term 'Mathematics without tears' one of the important ways is to use Vedic system of problem solving. Vedic mathematics brings to light the great and true the knowledge born of intuition and its hidden / potential techniques which are capable of solving various problems. The essence of Vedic system is simple, direct, one line and mental. The property of numbers is very extensively exploited in Vedic mathematics, particularly in the field of computations. Vedic method is perfectly adopted to oral teaching and mental calculation. It helps us to sharpen our calculating ability, gives answers in less time using less mental energy. The job of calculating becomes easy and interesting, because of the simplicity and the availability of more than one method.

Vedic mathematics, owing to its multi-choice facility, provides wonderful opportunities for the development of the innovative research facility of young students. A review of the research work on Vedic mathematics at different levels is presented here under.

Work shops, symposia, and seminars were conducted from time to time on Vedic mathematics but very little research has taken place on Vedic mathematics. A Ph. D. thesis on

Vedic mathematics submitted by S. K. Kapoor, (1988) on Structural Frames and Systems of Vedic Mathematics has developed unique solutions for several instances like simple equations, linear equations, plain and spherical geometry. Sunitha, E. (2003) experimented on speed and accuracy of IV class children in multiplication and division through Vedic mathematics. The sutras used for these computations were : 1) *Nikhilam Navata Scaraman Dasathaha*; 2) *Parvatya Yojayet*; 3) *Urdhva Tiryabhyam*.

These sutras are found to be significantly more effective than conventional methods in developing not only speed and accuracy but also considerable enthusiasm and interest in the children to perform multiplication and divisions.

Daya Grace (2001) in her study on "The Effect of Vedic Mathematics on Numerical Ability of IV Class Children" found significant difference between the numerical abilities of the experimental group and controlled groups. Vedic method is found to be more effective than the ordinary method in developing numerical ability in the pupils.

In this paper, an experimental study titled "Comparative Effectiveness of Vedic Methods and Conventional Methods on the Acquisition of Numerical Ability in Mathematics" is presented. The researcher experimented four sutras i.e. 1) *Ekadhikena Purvena*, 2) *Nikhilam Navata Scaramam Desatah*, 3) *Urdhva Tiryabhyam*, 4) *Anurupyena* in developing Numerical Ability of VIII class pupils along with teaching the same through conventional methods.

Numerical Ability

In this study numerical ability was taken as the ability to use and apply the four fundamental operations in the problems. This can also be stated as the ability to manipulate the numbers by efficient use of fundamental operations i.e. addition, subtraction, multiplication and division with speed and accuracy.

Objectives of the Study

1. To prepare a package on numerical ability based on Vedic Method.
2. To find the effect on the acquisition of the numerical ability of the pupils who followed instruction through i) Vedic method and ii) Conventional method.
3. To observe and compare the time taken by those pupils who received instruction in the i) Vedic Method, ii) Conventional Method to complete the given exercise.
4. To compare the numerical ability of the two groups of pupils.

Hypotheses

1. There is no difference between the Vedic method group and the Conventional method group in the time taken to complete a given exercise on numerical ability.

2. There is no difference between the Vedic method group and the Conventional method group in the acquisition of numerical ability.
3. There is no difference in the performance of pupils of a group after adopting to Vedic method.
4. There is no difference between the two groups of pupils in their performance.

Scope and Limitations of the Study

The study is limited to experiment only 4 sutras out of 16 sutras and 13 sub sutras and given a treatment of ten days. The treatment is given in multiplication, division, and squares by Vedic sutras upto the VIII class level.

Sample

A small sample of 70 students was selected from two different schools. Care was taken to see that the two groups are equivalent based on certain basic characteristics like age, SES, and levels of intelligence.

Experimental Design

Lokesh Koul (1984), Tuckman (1972) suggested and recommended quasi experimental designs which study the classes "as they are", and "where they are".

The investigator is of the opinion that two group experimental design i.e. experimental versus controlled group for pre and post tests would be suitable for studying the effect of Vedic methods and ordinary methods by taking intact classes. The two groups design with pre and post tests would help overcome certain difficulties encountered in one group design. In this design relative effects of two treatments were compared.

Therefore non - randomised intact pre-test, post-test design was selected and applied for present study as below :

Table 1
Non - randomised intact Pre - test and Post - test Design

| S. No. | Group | Pre - test | Treatment | Post - test |
|---------------|--------------------|-------------------|------------------|--------------------|
| 1. | Experimental group | T ₁ E | Vedic Techniques | T ₂ E |
| 2. | Control group | T ₁ C | Ordinary Method | T ₂ E |

Preparation of Packages on Vedic Method

The package consists of steps and procedure to follow and to perform the operations. The examples are given to each sutra in detail. The content is divided and planned in such a way that this package is suitable to give treatment for 10 days.

The experimental group was given a treatment by following the package prepared, based on Vedic sutras which are suitable for multiplication, division, and squares. The control group was given a treatment based on conventional methods on the above said operations.

The investigator selected 4 sutras which are suitable to develop numerical ability on different mathematical operations. The sutras selected for the study are explained briefly with an example for each sutra.

1) Ekadhikena Purvena

It really means that one more than the previous number. This method is useful for squaring numbers ending with 5.

Example : Find the square of a given number 15

Steps to Apply this Sutra

- | | |
|--|-------------------------|
| 1. Find the square of the number in the units place. | 1) $5^2 = 25$ |
| 2. Add one more (i.e. Ekadhika) to purvapada '1' the number in the tens place i.e. $1 + 1 = 2$. | 2) $15^2 = 1(1+1) / 25$ |
| 3. Multiply the resulting number with purvapada i.e. $1 \times 2 = 2$. | 3) $= 1 \times 2 / 25$ |
| 4. Write the number on the left of the number obtained in step 1. | 4) $= 2/25$ |
| | $15^2 = 225$ |

2) Nikhilam Navata Scaramam Dasantha

This sutra literally means "All from 9 and the last from 10.

Multiply 96×97

Steps to Apply this Sutra

- 1) Select the working base near to the numbers. Here '100' is the working base to these numbers.
- 2) Find the difference between working base and each number and write as follows :

| given number | Difference from base |
|--------------|----------------------|
| 96 | 04 |
| 97 | 03 |
| <hr/> | |
| 93 | 12 |

- 3) Multiply the differences.
- 4) Subtract either $(96 - 3)$ or $(97 - 4)$ and write in the result column.
- 5) The answer 9312 or $96 \times 97 = 9312$.

3) Division by the Sutra 'Urdva Tiryabyam'

Meaning of the Sutra is 'Multiply vertically and cross wise'.

This is the general formulae applicable to all cases of multiplication and will also be very useful and easy in division of a large number by another large number.

Divide 3389416 by 72

Steps to Apply this Sutra

1. First digit (7) of the divisor will be used for dividing. The second digit (2) will be used for correcting the dividends.
2. The first two digits of the quotient 33 is first divided by 7 to give a quotient of 4 and remainder 5. The quotient is written under the second digit below the line and the remainder is written just below the second digit as :

$$\begin{array}{r} 58 \\ 33 \overline{) 89416} \\ \underline{5} \\ 4 \end{array}$$

$$33 = 7 \times 4 + 5$$

3. The remainder 5 is combined with the next dividend digit 8 to form the partial dividend 58.
4. From '58' the product of previous quotient digit 4 and second divisor digit 2, is subtracted to obtain the corrected partial dividend.
i.e. $58 - (4 \times 2) = 50$
5. This corrected partial dividend (50) is now divided by 7, to obtain a quotient digit '7' and the remainder 1.

$$\begin{array}{r} 50 \\ 33 \overline{) 89416} \\ \underline{51} \\ 47 \end{array}$$

$$50 = 7 \times 7 + 1$$

6. This remainder and the next dividend digit 9 form the next partial dividend 19. From which the product of previous quotient digit 7 and second divisor digit 2 is subtracted to form the corrected partial dividend 'd' i.e. $19 - (2 \times 7) = 19 - 14 = 5$.
7. This corrected partial dividend '5' is now divided by 7, to obtain the quotient digit '0' and remainder '5'.

$$\begin{array}{r} 5 \\ 33 \overline{) 89416} \\ \underline{515} \\ 470 \end{array}$$

$$05 = 0 \times 7 + 5$$

7. Write this number left of the number = 386
 8. Write this number to the left of the number obtained in step 4 i.e. = 38610

Testing of Hypotheses

The objectives were analysed and the hypotheses were tested by following the simple statistical techniques. The data analysis is presented in brief in table 2, and 3.

Table 2
Comparison of time taken to complete a given exercise

| Group | Test | No.of | Avg. | Mean | S.D. | SEd | 't' Value | Result |
|--|-----------|-------|--------|-------|------|------|-----------|----------------------------|
| Vedic Instruction (Experimental) Group | Pre-test | 35 | 60 min | 38.3 | 6.15 | 1.71 | 12.7 | *Significant at 0.01 level |
| | Post-test | 35 | 35 min | 60.0 | 8.00 | | | |
| Conventional Instruction (Control) Group | Pre-test | 35 | 60 min | 37.00 | 6.16 | 5.7 | 0.63 | Not Significant |
| | Post-test | 35 | 60 min | 33.14 | 5.00 | | | |

Table 3
Comparison of Numerical Ability of Two Groups

| Group | Test | Group | No. of Students | Mean | S.D. | SEd | 't' Value | Result |
|------------------------|--------------------------------------|-------------|-----------------|-------|------|------|-----------|-----------------|
| Before Experiment | Pre-test | E.G. (V.M.) | 35 | 35.00 | 6.16 | 5.7 | 0.63 | Not significant |
| | | C. G. | 35 | 33.14 | 5.00 | | | |
| After Experiment | Post-test | E.G. | 35 | 60.00 | 8.00 | 1.6 | 16.78 | Significant |
| | | C. G. | 35 | 34.16 | 5.00 | | | |
| Difference Performance | Pre, Post differences or gain scores | E.G. | 35 | 21.00 | 3.16 | 0.85 | 21.4 | Significant |
| | | C. G. | 35 | 2.3 | 3.36 | | | |

Findings

1. The time taken to complete the pre-test by two groups of the pupils is same.
2. There is a tremendous difference in the average time taken to complete post-test by two groups of pupils.
3. Significant difference is found in the speed, accuracy, and average performance of the pupils after receiving instruction through Vedic techniques.
4. There is no significant difference between pre and post performance in the pupils who received instruction through conventional method.
5. Significant difference is observed between the two groups of pupils in the numerical abilities after treatment.
6. Pupils who received instruction through Vedic method showed greater numerical ability than the pupils who received instructions through Conventional method.
7. Significant difference is observed in the performance of the two groups of pupils.
8. The mean of performance of experimental group is greater than the control group.

Conclusions and Discussion

From the above observations we can conclude that instruction through Vedic techniques effected the children significantly in developing speed, accuracy and average performance where as conventional method is not as effective. There is no difference in their performance and the

| Testing Procedure No. | Result | Findings |
|--|--|--|
| 1. Time difference noted | Vedic method pupils took less time to perform the conventional method pupils take took more time to perform | Vedic method of instruction motivates the students to perform operation in less time |
| 2. Comparing of Pre & Post means scores | t - 12.7 significant at 0.01 level | Vedic method of instruction is effective in developing speed accuracy and achievement |
| 3. Experimental group ii) Control group | t - 0.63 is not significant at both levels | Conventional method of instruction gives no significant effect in performance of N.A. |
| 4. Comparing of performance scores of two groups E.G. and C.G. i) Pre - test ii) Post - test | t - 0.63 it is not significant at 0.01 level & 0.05 levels t - 16.78 it is significant at both the levels i.e. 0.05 and 0.01 levels | i) Before conducting of experiment there is little difference. ii) After the experiment there is notable difference. There is significant difference in performance of N.A. in the pupils who followed vedic instruction those conventional instruction |
| 4. Comparing the difference of performance scores of E.G & C.G. | t - 12.7 significant at 0.01 level and 0.05 level | There is significant difference in performance scores of E.G. and C.G. |

pupils remained as they were before the experiment. The effectiveness of Vedic techniques is significantly more than the conventional techniques in developing speed, accuracy and ability in manipulating the operations multiplications, divisions, squaring and finding squareroots.

Even though both the groups of pupils are almost equal in their numerical ability before the experiment, the pupils who received instruction through Vedic techniques proved better than those pupils who received instruction through conventional method. It is observed that the pupils received instruction through Vedic method are more active and also developed positive feelings towards mathematics.

These results help us to know that Vedic techniques are developing speed, accuracy and numerical ability strikingly when compared to conventional method. Assuming that the problem-solving abilities of the two groups of students is the same, to begin with, the mathematical computations involved in a problem do make a great deal of difference. The Vedic group is able to surmount and clear the necessary computations with speed and accuracy. The computations are posing a problem to the conventional students resulting in slowing down the process with creeping inaccuracy.

This basic underlying factor, which is extremely important and essential in mathematics is found to be the cause in bringing about the differences observed in the experimentation. While the Vedic group with their over riding success enjoy solving problems joy and comfort, the conventional group ended up in tears and dis-interest.

Mathematics teacher will do well to understand and fulfil the basic needs and eliminate difficulties of children through innovative techniques and suitable methods like Vedic methods.

Educational Implications

1. The study implies that new and quick methods in numerical calculations and comprehension by a simple rule, which, when applied and practised, develops a high standard of mathematical capability.
2. This large flexibility of methods finds itself reflected in the mind, when approaching a problem from the Vedic view point. The supreme simplicity and ease of the Vedic method is lacking in most of our usual methods.
3. This approach provides a corrective method to the problem of mental slavery to calculators.
4. This approach coupled with some practice clearly shows that we are dealing with an entirely new and direct way of thinking.
5. Package prepared for this study incorporates explanations and worked out examples of all the methods used and includes descriptions on how to set out written work also.
6. This study revealed that understanding of these techniques will help a child to enjoy mathematics much more, and will enhance creativity in the young minds besides developing healthy respect for our own traditional sciences.

Conclusion

From the very conceptional frame work of the Vedic methods of learning mathematical skills and their direct and simple applications to mathematical computations, together with the supportive findings of research carried by the educationists cited earlier, it can be concluded without loss of generality, that Vedic mathematics techniques offer a positive potential for easier and more joyful learning than the stereo typed traditional methods with emphasis on rote memory.

The age old techniques in Vedic mathematics which have been conveniently forgotten and neglected can be tried by teachers and students for greater satisfaction and effectiveness. Teaching through Vedic methods let us help our children to learn mathematics with smiles on their face and joy in their hearts.

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COMPUTER APPLICATION IN SCHOOL EDUCATION

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Computer Education has become one of the essential needs of the present educational system. These are the days of computers being friends to all- students and teachers. Computer literacy has become an essential aspect in the school curriculum. Computers are being used in different areas in school education. They help the students and teachers in the teaching-learning process. On the administrative side computers enable effective administration of school and help to have good governance of the schools. Through the use of computer evaluation, both of the institution and the student would be more effective and efficient. Thus, computer application in school education has a number of advantages for children, teachers and for the school at large.

Introduction

Computers are so familiar to everyone as they are increasingly used in our everyday life. Now-a-days computer literacy is considered to be a top educational priority. Computers not only provide education but also entertainment for children of all ages. In schools and colleges, computers can help to teach almost any subject in a new and more interesting way. More and more computers are being used at home for learning and also for playing games .In the teaching and learning situations there are diverse uses of computers. Teachers knowledge about computer's in general would enrich their competencies and classroom practices for the delivery of quality education in schools. A computer can supplement books, magazines, videos, and other media. Therefore it is necessary for every teacher to know the basics of a computer. In general the future teacher of this digital era should be Windowed, Webbed and Wired, the three important W's of a computer literate.

Objectives

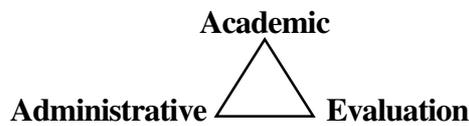
The major objectives of this paper are as follows :

1. To identify the different areas where computers are being used in school education.
2. To highlight the benefits of the use of computers in school education.

There are many areas in the school education where computers can be used. Some of the areas are represented diagrammatically as :

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Computer Application in School Education



Computers in Academic Aspects

In the last 15 years, computers have sparked a revolution in education. People from all walks of life, from pre-school children to senior citizens now put computers to work for their own intellectual benefit. We find computers in classrooms where they have become as essential to the learning process as books, papers and pens. Computers are powerful 'instruments', which can be used successfully for achieving a number of educational goals. They stimulate and support various teaching-learning processes and activities.

Teachers and students should take an interest in using computers in teaching and learning and make the teaching-learning process lively.

i) Computers and Students

Computers may have profound effect not only upon the development of children's minds, but also upon the nature of education itself. Computers are not just passive instruments added to the classroom and they are not neutral black boxes. Computer is a versatile technological instrument that can be used in fostering children's thinking and learning.

In the classroom, students use computers to develop science projects, prepare reports and gather information from electronic sources around the world. Computers can be used to present facts and information to children and for automated practice and testing. Some of the ways in which the computers may be useful to students are listed below :

1. Use of computer programming as a developmental or 'authoring' tool.
2. Use of computers as a means for programmed instruction.
3. Use of computer in simulating experiments.
4. Computers as a productive tool both in content area and area of study for future use.
5. Computer assisted learning.
6. Computer managed learning.
7. E - learning or online learning.
8. E - journals.
9. Steganography.

Use of computers develop children's thinking and problem-solving abilities. Introducing children to programming will result in a new way of thinking and help the child become a rational being. There is a possibility of "transfer of training" from the acquisition of programming skills to think about non-programming problems.

Unlike recorded television shows, computer aided education programmes can prompt students for feedback and then respond with new information. Computerized tutorials also can teach, test for understanding, and re-teach based on how much the student has learned. Simulation software enables students tackle real world problems without leaving the classroom.

Computers and Staff

Computers enable the teachers to explore topics in-depth and receive more textual information accompanied by sound and video. Many teachers are enthusiastic about the computer as an interactive learning tool.

Developments in Information Communication Education Technology (ICET) have greatly influenced the pedagogical practices in the institutions of learning and teacher education. The applications of ICET to the field of education have played a significant role in changing the attitudes of teachers, describing education, training and teaching and redefining the curricular practices in schools and institutions of learning. Learning from various research projects, innovations and experiments in schools, computing educationists and researchers have designed different models of computer-based instruction.

By using computers materials can be presented in novel ways with the flexibility to adopt different learning and teaching styles. Computers allow children and teachers to enter successfully into different areas of activities in which they had previously felt unsure. In the library, students and teachers read magazines and journals directly from a computer terminal, without having to search the shelves for paper originals.

Computers In Educational Administration

Computers have a number of jobs to handle in the administration of the educational system. Computer-based tool applications help school administrators and office staff not only in the management of instructional process, but also in taking good management decisions, and in establishing good governance in the schools and organizations.

In educational administration, computers play a vital role. Some of the important applications are : i) preparation of student's admission list, ii) provision of online payment of admission fees, iii) preparation of attendance register of both staff and students, iv) preparing a time table and a work load chart, v) maintenance of leave registers, vi) academic profiles of the faculty, vii) database for student's bio-data and for important events.

Computers In Educational Evaluation

Computer applications in the field of educational evaluation can be considered in two ways :

- i) Computers in the evaluation of institutions
- ii) Computers in the evaluation of children.

The performance of institutions depends on various variables like the strength of the faculty, infrastructure facilities, laboratory facilities etc. The data and the information related to all these variables can be captured through computers more effectively and efficiently. Further the reports generated on the basis of the data collected will help to take right decisions at the right time. Also computerization of institutional services will allow us to accredit the institutions and to project their specialties.

The various stages of Computer Aided Evaluation process are : i) Identification of domains of learning and taxonomic levels of instructional objectives for all topics in a subject; ii) Preparation of test items and questions of different types on all topics; iii) Classification and storing of test items and questions by type, topic, domain, level, optimum time, marks etc.; iv) Preparation of weightage tables and Blue print; v) Selection of test items and questions in accordance with the weightage tables and Blue print to set the question paper; vi) Administration of the test to get student response; vii) Scoring the test papers and tabulating marks obtained; viii) Analysing the performance of individuals, group achievements and strengths and weaknesses of the course; ix) Drawing inferences and taking decisions vis-a-vis evaluation.

The research and development activities in the area of computer hardware have produced new tools and procedures of evaluation. For example, Optical Mark Reader (OMR), Image scanners, web camera, digital camera etc.

Conclusion

Computers have permeated into every sphere of school education, be it curricular, administrative or evaluative. Computers are now used as tools, tutees and tutors. Hence, it is important that teachers, administrators and curriculum framers be computer literates.

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ENVIRONMENTAL EDUCATION PROGRAMMES AT PRIMARY, SECONDARY AND HIGHER EDUCATION INSTITUTIONS

Dr. Grace Indira*

The main aim of presenting this article is to focus on environmental awareness to protect and sustain the environmental quality. Here certain activities concerning environmental awareness and sustainable development are classified according to the level of the pupils and the role of the teacher in creating awareness towards the problems of environment is highlighted.

Introduction

Environment which literally means 'surroundings' has a wide connotation including within its purview physical, biotic and human aspects of the earth. All that surrounds a designated ecosystem is called environment. (Tiwari and Yadav, 1983)

Man is a part and parcel of his environment. Due to his interaction with nature on a large scale, the balance of nature has been upset and environmental decadence occurred in most parts of the world. This might be because of environmental pollution or improper and unscientific exploitation of natural resources. This has posed a great problem to the existence of man, plant and animal life on the earth, threatening the very quality of man's life and his survival. So there is a need to increase awareness and understanding of environment and man's impact upon it and to find out effective ways to manage it. To achieve this goal, environmental education is most essential.

The International Union for the Conservation of Nature and Natural Resources has evolved the following definition of environmental education as an outcome of a conference held in Nevada in 1970. "Environmental education is the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his bio-physical surroundings. Environmental education also gives practice in decision making and self - formulation of a code of behaviour about issues concerning environmental quality".

Objectives of the Present Study

- ❖ To suggest feasible activities to develop environmental awareness in the pupils at all levels.
- ❖ To classify the activities or programmes on environmental awareness according to the level of the students.
- ❖ To highlight the role of the teacher in creating environmental awareness in the students.

Classification of Activities at Different Levels

The basic ideas are presented in the following table :

| Stage | Objective | Content | Teaching Strategy |
|-------------------|---|---|--|
| Primary | Awareness of environment | Surrounding environment from home to school and out-door situations | Audio-visuals and field visits |
| Lower Secondary | Real life experience awareness problem | As above and General science | Group activities in the school resource distribution |
| Higher Secondary | Conservation, assimilation of knowledge, problem identification and action skills | Science based and action oriented work | Creating awareness about various revolutions Programmes related to Environmental Management |
| Tertiary/ College | Sustainable development, based on experience with conservation | College/University based on Science and Technology | Exhibitions, Workshops, Seminars & Conferences |

Summary of the role of School and College Education in Environment

In the school education, National Council for Educational Research and Training (NCERT), New Delhi has been doing good work in designing syllabi, developing suitable text books, help books and guide books, charts, kits, teaching materials and aids both for students and teachers. Special emphasis has to be made on children because they are tomorrow's citizens and educating them is, infact, educating a generation.

Activities at Primary Level (Awareness of Environment)

At this level pupils can be introduced to the ideas of caring for others and caring for their environment. If an awareness and understanding is given to a child at home and school from the very beginning, they become conscious of environment and can integrate these two extreme processes. It is heard in schools, when children talk informally that you are lucky as you are the only child of your parents. This type of awareness is helpful to control population. Similarly the sense of quality of environment can also be developed in schools.

At the primary level, Environmental Education should permeate the whole curriculum in a subtle and conscious manner. Small but significant changes in habits are possible in any school situation. For example :

- ❖ conservation of materials like paper
- ❖ avoiding waste of electricity by switching off unwanted lights and fans
- ❖ closing water taps carefully after use
- ❖ avoiding destruction of plants in the school garden.

These are some of the activities that are already suggested. A few more may be added.

They are :

- ❖ Watering the school garden
- ❖ Maintaining the kitchen garden at home
- ❖ Avoiding destruction of environment by keeping the surroundings natural
- ❖ Avoiding sound pollution
- ❖ Using water carefully

The teacher must lead in this area by personal example and also by providing positive reinforcement when a pupil is observed practising such habits.

Activities at Secondary Level

Many programmes can be used for Environmental Education according to the suitability to the topic, local resources and other requirements. The more common are :

- ❖ Encouraging students to come by bicycles instead of auto rikshaw, car or any other vehicles.
- ❖ Basic knowledge and understanding of the environment and its inter - relationship with man.
- ❖ Competitions like essay, elocution, painting, drawing cartoons, quiz etc. on environmental issues.
- ❖ Exhibitions of posters, paintings, cartoons etc. showing environmental threats.
- ❖ Rallies, processions, corner meetings, street plays, display of traditional skills, all related to nature.
- ❖ Nature study camps, tracking, bird watching in selected sanctuaries and national parks.
- ❖ An Environment News Board in the campus, where pictures, posters, paper reports, slogans and any other related matters are to be displayed.
- ❖ Use of modern media for environmental concerns. Awareness of ecological imbalance can be brought about better through multimedia approach like the films, the tapes and slides, display of different aspects of biospectrum and eco-crisis.
- ❖ Maintaining 'Recharge pits' at home and in school to increase the ground water level. Accordingly plants can be grown and Flora and Fauna can be protected.

Awareness of ecological imbalance can be brought about better through multimedia approach. The films, the tapes, slides etc. cover different aspects of biospectrum and eco-crisis.

Class Discussion

A topic or problem like 'Air pollution' and its aspects can be discussed in the class. It does not require much money and the children are exposed to various aspects of the problem. Children can talk about the ways of pollution and they may be suggested ways to control it in simple manner.

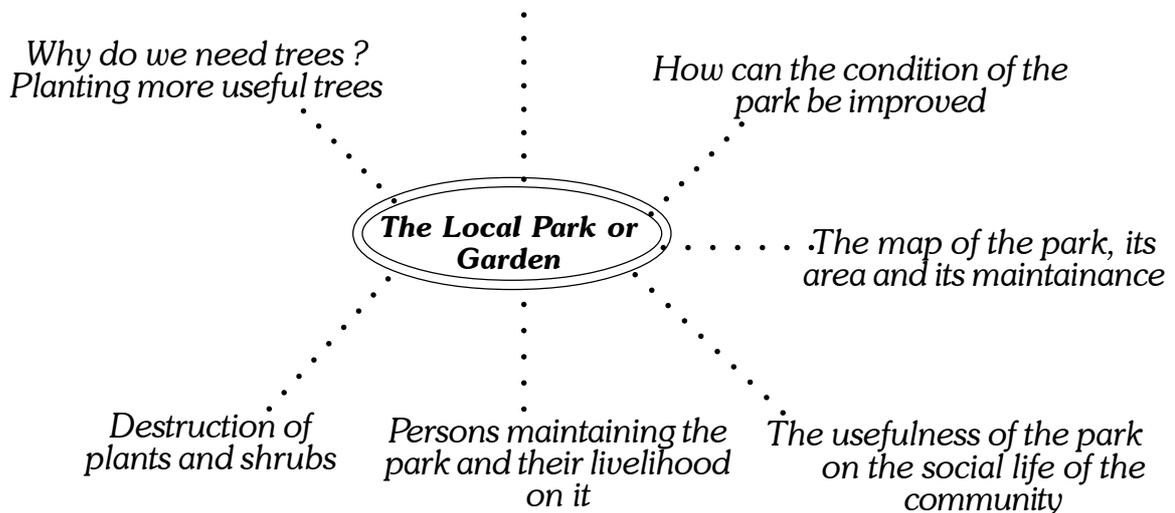
Small Group Projects

Here a class is divided into small groups and each group is assigned a project. The projects assigned to various groups may have some kind of relationship such as different aspects of environment, on those projects and finally report their observations to the whole class.

Example : Few topics for the small group projects on the theme "The local park or garden".

The Projects Proposed on 'The Local Park'

Aesthetic value



Activities at Higher Secondary Level

The activities which are interesting at this level are :

Out of class room experiences : Students should have regular practice in field trips, excursions, eco-development camps etc. as frequently as possible. They may include visits to neighbourhood or even a field, post-office, bank, the grocery store, the Zoo, the museum, the park or a nearby pond.

Out door Study : Out door study needs some planning and co-ordination among the members of the study team. Visiting industries and identifying the causes of environmental pollution and suggesting remedies, collecting the data about the 'traffic' on the nearby road etc. may prove very informative after analysis of the data collected. The teacher can evaluate the work done and progress made by the children.

Some more activities are :

- ▶ Campaign against sound pollution in the campus. Example : parking of vehicles.
- ▶ Video shows on environmental issues during intervals and lunch time.
- ▶ Observation of environmental days, weeks and months such as :
World Environment Day - 5th June
Earth Day - 22nd April
Wild Life Week - 22nd October to 29th October
National Environment Awareness Month - 19th November to 18th December
- ▶ Small projects of longer duration.
- ▶ Testing the purity of water, measuring and recording sound pollution and population density in the campus.
- ▶ Campus clean and green programmes.
- ▶ Yoga and naturopathy classes and training.
- ▶ Field trips for biological specimens collections.

Activities at Tertiary / College Level

- ❖ Interviews may be conducted by the students on the local problems such as :
i) drinking water facilities, ii) water pollution in their surroundings, iii) maintenance of trees and cleanliness, v) using automobiles for shorter distances, vi) regular pollution checking for their vehicles.
- ❖ Environment should be made an integral part of their curriculum and one question should be made compulsory in their examinations.
- ❖ Arts Festival and competitions in drama, painting, essay writing, elocution and creative writings.
- ❖ Organizing workshops and seminars.
- ❖ Conservation of non - renewable resources like fuels and minerals.
- ❖ Taking precautions against diseases like obesity, cardio - vascular ailments, cancer, alcoholism, drug - addiction and so on.
- ❖ Sustainable development.
- ❖ Writing letters to the civil authority concerned about your surroundings and writing to local news paper expressing concern for the existing situation and urging that corrective measures be taken.

These are a few activities cited as examples. We can think of any number of programmes or activities that can be implemented at different levels.

Role of Teacher in Implementing the Activities

The very objective of Environmental Education is to learn the skills of gathering information, developing desirable attitudes, values and habits. So, the teacher has to act as a guide and stimulate the children to use their abilities to acquire information. The teacher may structure the learning experiences and activities and prepare the students. The functions of the teacher are as follows :

- a) to arouse the children's interest in the environment and to raise challenging problems;
- b) to discuss the approach to problems or topics;
- c) to organise working groups;
- d) to arrange visits;
- e) to provide reference materials for children's use;
- f) to provide materials needed for practical work;
- g) to arrange for visiting speakers;
- h) to initiate and develop discussion and debate; and
- i) to provide facilities for displays and exhibitions.

Thus the teacher plays a vital role in Environmental Education. Teachers can make a habit of observation by setting themselves small exercises like :

- i) Each day, find out something about your neighborhood or city. For example :
 - the name of a tree which is flowering nearby or a bird not seen in these parts.
 - the location and other details of a museum, library etc.
 - the history of a local monument
 - information about local customs / crafts
 - information about local industries, pollution and so on.
- ii) Turn your attention to small, everyday items : work with a partner and see if your can identify materials by touch, smell or sound when you are blind folded.
- iii) Try and visualise everyday things. For example can you tell without looking.
 - the position of buttons / button holes on a man's shirt.
 - The position and number of lights on your street.

Conclusion

The harmonious survival and well being of human beings and, all other species, well being of the earth, natural resources and all factors that support life on earth must become an essential goal of education. It requires satisfying the needs of all people for food, water, clothing, shelter, energy and providing jobs and maintaining health of all for a better life. Life of all other

organisms and the quality of the nature are related to man's existence and, therefore, today there is a great urgency and responsibility on his part to maintain all other species and nature. For this purpose a few activities were suggested which can be easily followed by students at different levels. Though a formal classification is made, depending upon the area, social background, ability and attitude of the students any activity which helps in the protection of environment can be used. According to the need and availability every individual can think about few possible activities that can be adopted. Each student has to feel it his / her responsibility. Their minds have to be set with positive attitude towards life and environment. Here the role of the teacher cannot be underestimated. He is to motivate, guide and inspire them so that this programme becomes fruitful. Thus this paper is a humble attempt to guide the future generation into happy and healthy life in the harmonious environment with sustainable development in all respects.

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SEX EDUCATION - NEED OF THE HOUR

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In the words of George Bernard Shaw "Instruction in sex is as important as Instruction in Food."

Conversing on sex and sexuality was considered a taboo till now. But as on today sex education at all levels including primary, secondary and higher education should be recognised as an immediate concern. The onset of puberty causes anxiety among the adolescent children about the rapid and significant physical changes (size and sexual maturation) that occur naturally. Hence, it is a dire necessity to integrate and personalize the knowledge of these changes gradually, along with the other subjects. It helps to make the students aware and ensure safe behavioural patterns, preventing the physical, social and emotional problems.

Introduction

Sex Education today is widely recognized as a tool in generating the awareness i.e; the basic knowledge of one's own body, its functioning and behavioural aspects of sexuality. However, its implementation suffers from teething problems.

Age-old inhibitions and taboos form a barrier between generations, preventing the elders from freely sharing their knowledge with the youngsters about the sexual side of living. Vague, unspecific views and opinions deter the need for character-building and undermine importance of sex education in one's life.

Majority of our populace lag behind in the elementary knowledge of sex that is sometimes puzzling and worrying. Insufficient understanding affects their physical and mental health.

Various Studies Opined on AIDS

Data reveals that youth in the age group of 15 to 24 years constitute 1/5th of the total HIV infected individuals. In some African countries like Botswana, life expectancy was reduced by 26 years during the past decade on account of AIDS. 1/9th of the global HIV infections are in India. At this juncture, the only solution appears to be sex education at all levels, through designing the curriculum to bring about proper understanding of the problem and to evolve effective preventive measures.

Objectives of Sex Education

- ❖ To equip with accurate knowledge and imbibe attitudes in relation to the fundamental aspects of sex education at school level
- ❖ To promote scientific basis about the common myths and misconceptions about sex, sexuality, reproductive health etc.

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- ❖ To develop healthy life-styles and preventive and risk reduction behaviours that ensure good health
- ❖ To acquire skills like decision-making, dealing with peer pressure, responsible sexual behaviour etc.
- ❖ To instill values that influence them in their formative stage thus preventing emotional, social and health problems
- ❖ To feel at ease while talking about sex related problems and diseases.

Inadequacies

Sex education is perfunctorily taught at Classes IX and X by science teachers. The communication patterns are found to be ineffective. Therefore, children are not equipped with sufficient knowledge to act suitably to vulnerable situations.

Need for Interventions

Opinion collection at a wider range empirically proved that sex education should be the shared responsibility of parents and teachers, supplementing and reinforcing each other.

The child learns from parents through verbal communication and also from the feelings that are constantly conveyed in their behaviour. However, most parents do not know what and how to convey / teach. Hence, the onus lies more on the teachers to supplement this shortfall.

Sex education through parents or teachers can have disastrous consequences, when they are not adequately informed or competent to do it. Every teacher should have thorough knowledge on the rudiments of sex education and appreciate its need for the individual and the society at large.

Teachers have to make conscious effort and particularly those teaching Biological Sciences are required not to lose any opportunity of discussing sex education during the course of their teaching, considering the age and understanding capacities of children.

How to Share

Considering the backdrop of rising child exploitation and sexual abuse in the present day society, a proper mix of sex instruction with morals and value systems are to be incorporated in the curriculum for effective results and to enable the students develop the right perspective. Awareness on sexual matters should however be created intelligently and methodically using simple and elementary facts. Through open discussions, individual interactions, and by providing question boxes the teacher can answer the questions of the students frankly and remove myths and misconceptions. Use of a variety of educational tools, viz. posters, flip charts, slide shows, video and audio presentations, skits etc.; would be beneficial.

When to begin and What to include in this Instruction

Introduction of sex education should not be postponed till the dawn of adolescence. It is always best to start early and proceed progressively to children and adolescents at various levels of primary, secondary, pre-university and so on.

Ignoring the vital needs of sex education has a debilitating influence on the young minds of today. Globalization leading to inculturation, obscene movies, free vulgar literature, porn on internet are adding to the woes of confused youth, prompting them to trek on wrong paths. The best solution to address this social menace is to spread the knowledge of sex education through planning the curriculum and implementing the same with adequately designed packages related to matters of sex differences, seminal emissions, menstruation, ovulation, mating, fertilization, pregnancy, birth of babies, masturbation, common sex perversions, homo sexuality, and sexually transmitted infections.

Role of Other Agencies

Sex being an integral part of every individual's private life, sex instruction from the regular faculty may not sometimes serve the purpose at expected levels because of the unfamiliarity with the technical terms and lack of the required attitude and straight forward manner on the part of the faculty. For better results, it may be appropriate to draw the services of medical practitioners, counsellors, psychologists, voluntary organizations and experts from corporates manufacturing items of sanitary care to augment the cause of sex education.

Educational Significance

To avoid harmful consequences, students at school, college and university levels should be focussed at sexual hygiene and health rules that they must observe and should be made aware of the dreadful diseases that might plague them if they don't. It is hightime that both men and women teachers be given special orientation and updation sessions on this subject, they being the field guides to children.

To curb any further damage, immediate steps are needed to ground sex education not only in urban areas but more significantly in rural India, where the incidence of HIV/AIDS is very high. The education packages should be so designed to suit the needs of children of different age groups and be compatible with Indian culture and religious orientations. A thorough study of teaching patterns of sex education in the West too needs to be taken into consideration. Enlightenment of the misguided individuals helps in developing proper insight and directs them towards desirable channels for a healthy society.

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Two Modes of COGNITION : SCIENTIFIC AND SPIRITUAL

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This paper discusses some issues commonly raised in regard to the relationship between science and spirituality. It also examines the issues of the apparent similarities between statements made by scientists and those made by the seekers of ultimate truth concerning the unity of existence; material and living beings on the mother earth including the human kind as well as other planets. A few observations relating to the two sub-systems of human cognitive system and lastly a few educational implications are also given.

Getting up when you fall teaches persistence and courage,
Trying new things teaches self trust and creativity,
Gentle forgiveness teaches compassion and love,
Silence and listening teaches wisdom and thoughtfulness.

Can one be scientific and yet be spiritual ? A simple answer to this very important question of our age is an emphatic 'Yes'. By being truly scientific and yet spiritual we can make the present and future of man abundant and meaningful.

Objectives

1. To see if there is any relationship between science and spirituality.
2. To look into the views of scientists.
3. To observe the relationship between rational thinking and intuitive thinking.
4. To suggest ways to develop the two modes of cognition in the students.

Relationship between Science and Spirituality

We all know that faith is a working basis for a true scientific investigation. Again it's well known that faith is the foundation of spiritual life. This was also proved by the great scientist Einstein's own life, where science and spirituality are harmoniously and beautifully integrated. Spiritual people speak the same tongue and teach the same truth, so also a man of science. Objectivity is their passion.

Sri Rama Krishna Paramahansa's life was a long saga of inquiry into the nature of God. In this he never deviated from the scientific methodology of observation and experiment disciplining his body and mind just like an astronaut intending to go in a space vehicle. This might have been

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the reason why SWAMY VIVEKANANDA had said that he learnt Science from Sri Ramakrishna.

The subjects science and spirituality are getting more and more important to man in the modern age. They are two great disciplines which, in the light of Indian wisdom, reveal that, when relied on, separately, can be counter - productive in the long run, but, when combined harmoniously, can bring about an all - around expression of human genius and total fulfillment.

The relationship between the two has not been quite happy due to the world - wide impact of materialism. The 20th century saw a new approach becoming evident, as the representative thinkers among scientists and religious people beginning to discern a close interrelation between science and spirituality. They are slowly veering round to the point of view that science and spirituality can heartily embrace each other and work for the good of humanity.

It is being realised, more and more by both, that there are elements in science that spirituality can adopt in order to fortify itself, and elements in spirituality that can deepen and strengthen science. Science as lucifera and science as fructifera, i.e., science as light and science as fruit, are intimately related.

The contribution of Indian thought is the search for truth, the ultimate truth which is beyond the material plane. In this great task of reconstructing the mental life of modern man by bridging the gulf between rational mind and intuitive mind, on the basis of a unified view of man and a truthful conception of the spiritual life.

Is religion to justify itself by the discoveries of reason through which every other science justifies itself? Are the same methods of investigation, which we apply to science and knowledge outside, to be applied to the spiritual science?

A study of the Upanishads reveals that the subject of spirituality was approached in ancient India in an objective and dispassionate manner. It aimed to get at truth and not to hug pleasing fancies and illusions or idolise tribal passions and prejudices.

Experience is the only source of knowledge. In the world, spirituality is the only science where there is no surity, because it is not taught as a science of experience. There is always, however, a small group of men who teach spirituality from experience. This is the real science of spirituality. As mathematics in every part of the world does not differ, so also the experiential science of truth. They are all similarly constituted and similarly situated.

Spirituality deals with the truth of the meta physical world, just as chemistry and the other natural sciences deal with the truths of the physical world. There are two worlds, the 'microcosm' and the 'macrocosm', or the internal and the external. We get truth from both of these by means of experience. Physical truth must have its counterpart in the internal world, and the internal world must have its verification out side.

Spirituality does not oppose the knowledge of physical sciences or any science. It only helps in filling the gaps and make it a whole. For a person to do a scientific experiment he has to be trained to acquire those skills. In the same way a spiritualist also has to be trained under the strict supervision of an experienced Guru. The success of the Guru depends on the success of the trainee. To attain perfection is the ultimatum in both. Both of them have formulated difficult and integrated methods of experimentation which are not available to a lay person. As spiritual education, our scientific disciplining also enhances the consciousness by developing observation and thinking abilities. We have a feeling that knowledge acquired by spiritual education is incomplete.

As John Wheeler says according to quantum theory, "The observer, the instrument and the experiment are inseparable and internalised parts in the universal process". Spiritual education also says the same but physics recognises this through the observed phenomena outwardly where as spiritual education experiences through observation inwardly. So a spiritualist develops his experience through intuition, where as a scientist develops his consciousness through logical knowledge. Both these practices are to be co-ordinated for the co-existence of human beings.

Scientists' View

Scientists now believe that we can develop children by training them to do regular meditation. Few scientists like A. Kekule, James H. Luba, Karl Popper revealed that the discoveries they have made were found in a state of meditation. Einstein said "of all the emotions we have, most beautiful one is spiritual experience. It paves way to science and real art. Those who do not have that experience are equal to dead people In this context I have a religious faith". Ren. E. Weber in her dialogues with sages and scientists maintains that both the scientist and the mystic seek unity in the universe or reality. A parallel principle derives both science and spiritualism - the assumption that unity lies at the heart of our world and that it can be discovered and experienced by man. While the methodology of science is quantitative and mathematical, the methodology of spirituality is meditational.

Scientific method is cognitive and analytical, it studies the universe piece meal. It claims its results to be objective and value free. The mystic's unity is experiential - it is union with the infinite (for instance, the "Thou art that" of the Upanishads). While the scientist seeks to unify, believes himself out of this "equation", in spite of the fact that in quantum mechanics the observer and the observed are "admitted to constitute a unit". According to Weber "The scientific community has not yet caught up with the full meaning of this declaration. The relationship between what he calls the super implicate order (1) and what he calls the implicate order is similar to the relationship between consciousness and matter.

In as much as scientist is studying the mathematical order of the universe, and in as much as mathematics is meaning and meaning is a property of consciousness, the scientist is ultimately, like the mystic, studying consciousness. She felt that "In some ways the pure mathematician is going into one of the aspects of consciousness." She further says that although the scientist is "inspired by the experience of matter, nevertheless once it has entered consciousness he is trying to find something that goes on in consciousness which has an order of its own."

Copenhagen's Interpretation of quantum mechanics emphasises that we do not actually study reality, but only interpret reality. It's just that no matter what theory a physicist arrives at, it must, as a theory, preclude the person of the scientist as part of the unity.

It is merely a concession on Bohm's part to mysticism when he says that 'thought cannot reach reality' or that 'the physicist studies consciousness'. These statements made by him are not consistent with his being a physicist, for they are not compatible with science or its method.

Serious scientific investigations have been put forth in an effort to study phenomena such as subtle energies (qi or prana), psychic healing, clairvoyance, hands on healing, healing through prayer, near - death experiences, and out of body experiences to name a few. Although the concept of subtle matters and subtle bodies have been dismissed and ignored by scientists, mystics have persisted in this knowledge. Against this background we now have the recent scientific discovery of a "dark matter " in the universe.

Rational Thinking Vs. Intuitive Thinking

In the International Society for the System Science, (ISSS) some people have expressed concern about spirituality being discussed in a scientific society like ISSS, apparently because they think that there may be some disagreement or even conflict between science and spirituality. One reason seems to be, that some spiritual people do not live up to the ideals of science, concerning a critical attitude. Lack of critical reflection is, however, also observed with many non spiritual people and with in science itself and conversely some persons to whom spirituality is important do practice the level of criticism ideally required by science.

So methods of investigation in the field of spirituality are largely the same as in the positive sciences like psychology. Collection of facts, their classification, a dispassionate study of these so as to reveal the law or laws underlying them, such knowledge leading to the control over the phenomena concerned, and finally, the application of such knowledge for the techniques of man's spiritual growth, for the alleviation of human suffering and for the enrichment and fulfillment of human life. This kind of study of spirituality, as a thorough scientific study of the facts of the inner life, was under taken by the great sages of ancient India. The insights which they gained were re-tested and amplified by a galaxy of subsequent sages, leaving to posterity the invaluable legacy of a rich and dynamic scientific tradition in the field of spiritual science.

Nuclear physicist Erwin Schrodinger, in his book : 'What is life' ?, echoes this Vedantic truth of "the unity of Atman as pure consciousness which is the goal of all Vedanta" - Atmaikatva - *Vidya pratipattaye sarve vedantah arabhyante*, as said by *Sankaracharya* in his Brahma - Sutra commentary (Sutra 4).

The quantum energy field or the four - dimensional space - time, which physics presents as beyond sensory verification, finds its counterpart in vedanta in its cittakasa - the akasa or the void of citta, or mind. This is the knowledge field or consciousness.

During its relatively short history modern science has undergone several fundamental changes called paradigmatic shifts in the literature on the philosophy of science. The advent of modern systems science constitutes such a paradigmatic shift. Systems science can give a correspondence with spirituality in words or mathematics which is helpful in our attempt to communicate and perhaps obtain an inter-subjective agreement.

Considerable evidence indicates that our cognitive system consists of (at least) two sub-systems, one rational or scientific and the other intuitive or spiritual. Since these sub-systems work on overlapping data bases, it seems understandable that sometimes they come up with comparable results.

Only, these results are experienced consciously in widely different ways. Further, although the two subsystems are working in parallel, they probably influence each other, because the human person appears to function as a self organizing system. This is also brought out by more detailed studies : intuitive and spiritual ideas can be contemplated rationally and in the end give rise to rational scientific conclusions, which may again give rise to new intuitive ideas, so that a progressive development of knowledge occurs.

Educational Implications

It is necessary to begin the training of our pupil in the scientific attitude and outlook from the stage of primary education itself. This purifies and strengthens the rational and spiritual heritage of our country. The pupils also should be trained to face the real life situations and to solve the problems arising intelligently.

Mind is the most important instrument connecting us to the nature within and without. If it is in perfect balance, it not only brings out physical well being, but also helps us to lead a balanced happy life for which one should take up meditation which is the panacea for all evils. It is a well known fact that a traditional meditation in Buddhism enables the meditator to experience the unity of space, matter, and consciousness. So meditation raises the standard of life or quality of life by bringing in happiness, contentment and fulfillment. This refers to the man making dimension of a person's life.

As we advance into this inquiry and research into our tradition, we shall get an increasing grip on the human situation in our country, through the reformulation and implementation of

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educational goals and processes in the light of our own philosophy of man, whereby a happy synthesis of physical sciences with the science of spirituality will be achieved, resulting in total human enrichment, internal as well as external, qualitative as well as quantitative.

The disparity between man's knowledge of his self and control over his inner nature on the one hand, and his knowledge of and control over the external nature on the other, in short, between his moral efficiency and his technical efficiency, confronts him with the most serious problem that his evolution has so far seriously posed.

The only solution lies in the deepening and strengthening of his moral and spiritual awareness. The dynamism of human evolution demands that this education of man must continue till he rises from ego - centerdness to ego - transcendence. Thus the spiritual growth of man is a necessity. And the more we know the science and technique of this growth, the better for us and for our society.

For a human being, particularly, his own self is his teacher; because he achieves his welfare through inquiring into direct sense experience and (inductive - deductive) the inference based on the same.

Teachers, the architects of the nation, should try to inculcate the two modes of cognition in the children. Their teaching mode should definitely reflect the harmony of science and spirituality which is an urgent need in the present day society which is full of conflicts. There is no doubt to say that out of the kind of today we are having comes the kind of tomorrow we are going to have.

It is well understood that one can be scientific and at the same time be spiritual, so the time has come for the judicious harmonization of science and spirituality which alone will give more relevance to life and living.

Wise men, who have mastered the science and art of spirituality, clearly realise God as the infinite reservoir of all energies. Let us remember that :

*we are not human beings with divine experience
But divine beings having human experience.*

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