TEACHING SCIENCE TO STANDARD IX CBSE STUDENTS THROUGH VALUE INTEGRATED EXPERIENTIAL LEARNING

A SYNOPSIS

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Guide

PROF. ASHUTOSH BISWAL

Researcher

BIBHUTI NARAYAN BISWAL

CENTRE OF ADVANCED STUDY IN EDUCTION (CASE)

FACULTY OF EDUCATION AND PSYCHOLOGY

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

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SYNOPSIS OF DOCTORAL THESIS ON EDUCATION

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INTODUCTION

Education being the key to empowerment of people, enhancement of its quality and accessibility is of paramount importance for all. We need to prepare our youth to be effective and beneficiaries of the emerging A3 (Anyone, Anytime and Anywhere) society. Emphasis on value education, pride for one's cultural identity while respecting other cultures and deeper engagement towards achieving higher goals is equally necessary during the formative years of students in order to prevent their undesirable drift as a consequence of the new found liberal environment(*TIFAC 2015 report*).

Kimble (1961) defined learning as a relatively permanent change in behavioural potentiality that occurs as a result of reinforced practice. With the tremendous progress of science and technology, it has become necessary for every man to understand and apply science to his day-to-day life. This is only possible though a systematic process of acquiring scientific information called science learning, in a definite schema called schooling process. Thus it is science teaching learning process primarily affects the overall understanding of every learner's about ***science*** in general in their respective lives. It is a well known fact that science concepts are delivered in our schools mostly in a traditional way, measuring mostly the students ability to recall and comprehend the important information. This idea of schooling is vehemently opposed by Secondary Education Commission (1952) and Report of Education Commission (1964-66) which states that Secondary Education aims to develop the intellectual, social, and moral qualities essential for democratic citizenship, and to prepare young people for entry into the world of work or for continuation of academic pursuit.

Recent scenario of Teaching of Science at Schools

Learning is the active process of constructing, or putting together, a conceptual framework by a process of interpretation. No one learns science by transmission - at least not meaningfully. In other words, it is important for science educators to understand the fundamental, culturally based beliefs about the world that students bring to class, and how these beliefs are supported by

students' cultures; because, science education is successful only to the extent that science can find a niche in the cognitive and socio-cultural milieu of students(Cobern,1996).

Too often teachers use lecture as their main instructional method in teaching science and classes are very much content oriented. Rote learning and memorizations are over emphasized in development of basic concepts due to which the students reasoning abilities are not being challenged (Clark,1996). This has created a scope for experiential learning approach in Teaching Science.

Characteristics of Experiential Learning

Experiential Learning **(EL)** proved to be the most attractive & effective way of Teaching Learning as it involves: Learner centric, flexible approaches rather than teacher controlled one. Learners' autonomy other than teacher guidance and directions is encouraged. It facilitates supports and encourages learning rather than teacher monitoring activity. Experiential learning must foster desirable behavioral change in the learner which is called as value reflections.

Value deterioration in School Education

A country is less known by its geographical boundaries, economic development , quality of industry, world class infrastructure, advancement in technological edge, scientific innovations, extraordinary sky scrapers and giant structural marvels , instead, the people who inhabit her distinguish the features of the country. Researches reveals that "The school is a place , which transmits value and forms attitudes. In an interactive learning environment of the school, where a child spends a maximum of eight hours of the day, human values can be inculcated by making the child experience and live with values"(Dhankar, 2010).It is expected that Experiential learning should invigorate value practices in learner through the subject Science.

Value integration in Science

We are all aware that science is essential for modern living, and it is going to play an increasingly significant role in the life of citizens in the decades to come. Economics and technical growth accrues to a society in proportion to the effectiveness with which it uses its scientific talents. It is a well known fact that Science requires careful and sometime planned observations, open-minded examination of all the facts and phenomena and a rational analysis, followed by a bold and forthright statement of findings which when generalized become propositions and theories. This method or process by which science itself has developed so rapidly is necessary in all sphere of life. The pertinent question for all of us is: how to elicit

hidden values from science curriculum for the betterment of humanity and assimilating values for the better understanding of science. Thus value integration with science teaching is considered as of paramount importance.

Experiential learning and Value education (3H approach)

While performing experiential learning ,the faith in Science process gives us self confidence, self satisfaction then self sacrifice and finally self realization. Main organs of faith is search for the Truth, Right conduct, Love, Equanimity and Non injury. Out of these five values, the first two i.e. Truth and right conduct contains distillate of all morality. An ancient Indian Edict say Sathyam Vada and Dharmam Chara , that means speak truth and act as appropriate to the duties and obligations of your position whatever it may be. When one performs Experiential Learning with unselfish love, there is perfect peace and equanimity in success or failure, pleasure or pain and joy and belief. Hence convinced learners engaged in Experiential Learning do not look for a shortcut which strengthens his integrity. Since, he seeks no unfair advantage over others, Honesty comes naturally. Where else the learner is not a self seeker, his loyalty is very steady and strong. Under these conditions, he says what he thinks, and does what he says. Thus there is perfect co-ordination between thought, word, and deed (3H) i.e. integration of Heart- Head – Hand. This helps in formation of sterling character of the learner. It is a well known fact that character is the hall mark of a learner. Life without a good character is like a shrine without light, a coin that is counterfeit, a kite without the string broken .Hence, strong moral character should be cultivated by the teacher with the help of good Science Education.

REVIEW OF RELATED LITERATURE

The review of related literature has been planned under following headings.

a. Value education in Education field

b. Trends in Science education

c. Experiential learning in Science education

d. Value education in science education with reference to experiential learning .

The investigator has gathered 62 studies related to Science teaching , Value integration and experiential learning respectively. A bird eye view of review is described as under.

STUDIES	Science teaching	Value Education	Experiential Learning	Value Education in science with reference to Experiential learning
India	15	22	04	03
Foreign	14	02	01	01
Total	29	24	05	04

Implications of the Review of related literature for the present study

The review of the related literature has enabled the researcher to formulate the relevant assumptions for the suitability of the present study.

- Develop a better understanding of how school students learn science by experimenting.
- Develop ways of organizing the content of school science for more effective learning.
- Develop a better understanding of the teaching of school Science .
- Develop materials and other resources for the teaching and learning of school Science.
- Integrate experiential learning approach for better understanding of secondary school Science.
- Understanding Science teaching and conceptions of the nature of science in India.
- Problems and possibilities of general Science education for better society.
- Develop an understanding about values associated with school Science.
- Development of strategies for value practices through Science Education.
- There were some significant age trends in respect of economic values; the boys and girls differed in political, theoretical, economic, aesthetic, religious and social values and the rural urban difference were also observed.
- It also become evident that the experiential learning approach in teaching science in CBSE schools of Navsari had not been tried out. It was also realized that Science curriculum transaction had not been approached from the perspective of value inculcation. The role of teachers also need to be adequately explored in relation to curriculum transaction through value integrated experiential learning as this does not appear to have received sufficient research attention.

RATIONALE OF STUDY

According to NCF (2005) our age old traditional teacher dominated " read and remember till asked" and "chalk-n- talk" practice ought to be replaced by pupil centered constructivist teaching learning process. Our Science education develops more competence but doesn't encourage inventiveness and creativity in our future citizen that are essential ingredients for the growth of our nation. Our examination system overpowers conceptual attainments and facilitates rote learning and mark scoring. External Examinations 'are largely inappropriate for the knowledge society of the 21st century and its need for innovative problem solvers'. Technology continues to profoundly affect the way we work, collaborate, communicate and succeed which has not been penetrated to all the strata's of academia involving science. Teacher's are not skilled to handle various e-resources to make their subject interesting that causes frustration and humiliation among learners.

Though CBSE is offering school education throughout Gujarat state, it introduced CCE from 2000A.D. in a phase wise manner in its ≈22000 affiliated schools, yet the impact of its has not been felt as far as Science teaching at secondary level is concerned. Gujarat is having ≈316 CBSE affiliated secondary schools struggling hard to crate its niche in all India Science teaching due to its poor quality of teaching & lack of good Science teachers.

India Science Report 2005(Shukla,2005) reveals shocking picture of Indian science and Technological growth. At the class VI to VII level, 22% of the students said they would like to study pure science at higher levels of education. Yet, when it came to students in class XI and XII, just 13.4% wanted to study pure science at the graduate/postgraduate level. Most of the teachers believe that more computers and equipments were required for teaching Science subjects since inadequate practical training was a serious issue. While 15% felt that teachers too required proper training, 11% felt the need for simplification of the course content. India scores lower than the US on attitudes towards science and technology(S&T), but not much lower. Seventy seven per cent Indians feel S&T makes our lives healthier and easier as compared to 86% for the USA. Sixty one per cent feel technology makes work interesting as compared to 89% in the USA. In the context of Science education, the goals of teaching and learning are largely directed towards engendering cultural and democratic notions of scientific literacy. It argues that in order to broaden students understanding of science, and better prepare them for

active and responsible citizenship in the future, the scope of science education needs to go beyond learning about scientific theories, facts and technical skills.

The science education system should emphasize the practical understanding of the principles of science with reference to modern technological advances. It is not the learning of specific and known application that has value, more important is the mind set, the confidence and the leaner's ability to apply the principles. Here is where the intellectual meaning of the new and ideal science education should lie with reference to globalization and rural up liftment of our country. What our India needs now is ***Scientific Humanism*** i.e. a concept which involves a progress in technology in relation to our cultural, economic, social spiritual, ethical and human values. This should be the aim of our school and higher science education **(**Kalra, 2008).

"…The enormous potential for India to become a leading knowledge power in the coming years can be realized only if our younger generation has opportunities for all round good education and training, especially in Science & Technology. Unfortunately however, the present state of higher education in the country is rather poor. In order to make it more relevant, to the changing needs of society, and thus to propel India to a position of leading knowledge power, we need massive investments as well as well planned radical changes in our higher education system"(Position paper by Joint Science Education panel,2008).

RESEARCH QUESTION

The following research questions were in the mind of the researcher to undertake the proposed study.

1. Whether values can be inculcated through value integrated experiential learning approach while teaching science?
2. Whether integrated approach of experiential learning for teaching science will affect the achievement of students in science?

STATEMENT OF THE PROBLEM

Teaching Science to Standard IX CBSE Students through Value Integrated Experiential Learning

OBJECTIVES OF THE PRESENT STUDY

1. To develop an intervention programme through value integrated experiential learning approach for teaching of science to standard IX students for the inculcation of values like: Learning to live together, Team work, Loyalty to duty, Tolerance, Flexibility, Curiosity, Environmental ethics ,Compassion, Gratitude, Quest for knowledge, Discrimination,, Honesty, Spirit of inquiry, Co-operation, Equality, Simplicity, Determination, Common goal, Dignity of labour, and Discipline.
2. To implement the developed intervention programme for teaching of science through Integrated experiential learning approach for the inculcation of the taken values.
3. To study the effectiveness of the intervention programme on integrated experiential learning approach for value inculcation in teaching science in terms of value conceptual knowledge, value perception and value practice of the taken values along with the achievement in science.
4. To study the reaction of students towards the intervention programme on Integrated Experiential Learning approach for value inculcation in teaching science.

HYPOTHESIS

The Present study is an experimental study. As per the objectives of the study following null hypotheses has been formulated for the testing in the present study. There were 43 hypotheses to be tested for the present study at **0.05** level of significance.

$H_0$1: There will be no significant difference between mean post- test value conceptual knowledge of learners taught through the Value integrated Experiential learning approach and learners taught through the Traditional Teaching Approach in the value of learning to live together.

$H_0$2: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Team work.

$H_0$3: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Loyalty to duty.

$H_0$4: There will be no significant difference between mean post -test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Tolerance.

$H_0$5: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Flexibility.

$H_0$6: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Curiosity.

$H_0$7: There will be no significant difference between mean post -test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Environmental ethics.

$H_0$8: There will be no significant difference between mean post test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Compassion.

$H_0$9 There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Gratitude.

$H_0$10: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Quest for knowledge.

$H_0$11: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Discrimination.

$H_0$12: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Honesty.

$H_0$13: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Spirit of inquiry.

$H_0$14: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Co-operation.

$H_0$15: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Equality.

$H_0$16: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Simplicity.

$H_0$17: There will be no significant difference between mean post -test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Determination.

$H_0$18: There will be no significant difference between mean post -test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Common goal.

$H_0$19: There will be no significant difference between mean post -test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Dignity of labour.

$H_0$20: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Discipline.

$H_0$21: There will be no significant difference between mean post-test value conceptual knowledge of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in twenty selected values.

$H_0$22: There will be no significant difference between mean post- test value perception of learners taught through the Value integrated Experiential learning approach and learners taught through the Traditional Teaching Approach in the value of learning to live together.

$H_0$23: There will be no significant difference between mean post test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Team work.

$H_0$24: There will be no significant difference between mean post -test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Loyalty to duty.

$H_0$25: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Tolerance.

$H_0$26: There will be no significant difference between mean post-value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Flexibility.

$H_0$27: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Curiosity.

$H_0$28: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Environmental ethics.

$H_0$29: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Compassion.

$H_0$30: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Gratitude.

$H_0$31: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Quest for knowledge.

$H_0$32: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Discrimination.

$H_0$33: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Honesty.

$H_0$34: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Spirit of inquiry.

$H_0$35: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Co-operation.

$H_0$36: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Equality.

$H_0$37: There will be no significant difference between median post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Simplicity.

$H_0$38: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Determination.

$H_0$39: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Common goal.

$H_0$40: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Dignity of labour.

$H_0$41: There will be no significant difference between mean post-test value perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the value of Discipline.

$H_0$42: There will be no significant difference between mean post-testvalue perception of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach in the twenty selected values.

$H_0$43: There will be no significant difference between mean post-test achievement scores of learners taught through Value Integrated Experiential Learning approach and learners taught through the traditional teaching approach.

OPERATIONAL DEFINITIONS

(1) **Value Conceptual Knowledge**: The value conceptual knowledge in the values is the total score secured in the value test prepared by the investigator.

(2) **Value Perception**: The value perception in the values is the total score secured in the value perception scale prepared by the investigator.

(3) **Achievement in Science**: The achievement in science is the total marks secured in the achievement test prepared by the investigator.

EXPLANATION OF TERMS

Value Practice: The value practice in the present study means the incidental behaviour of students.

Experiential Learning: Experiential learning in the present study means the process in which student construct their own knowledge in learning Science through six steps such as : Silent sitting , Topic initiation , Radiant thinking ,Mind Mapping and web charting, Group Activity,and Presentation.

Value Education: The value Education in the present study means the development of personality traits though teaching science for values like :Learning to live together, Team work ,Loyalty to duty ,Tolerance, Flexibility, Curiosity, Environmental ethics, Compassion, Gratitude, Quest for knowledge, Discrimination,, Honesty, Spirit of inquiry, Co-operation, Equality, Simplicity, Determination, Common goal, Dignity of labour, and Discipline.

Learning to live together: It is a feeling of an individual to become oneness with the members of own family and other members of the society. Major traits of a person having quality of Learning to Live Together are: assisting others to uphold living spirit, living in a joint family, live and let live ,much knowledge in a socially acceptable norms.

Team Work: Working together for the realization of common objective. Major traits of a person having spirit of team work are: to bring synergy to work for the goal, unity in achieving targets. Work to win, coordinated efforts.

Loyalty to duty: It is a trait of a person by which he remains committed towards any assignments. Major traits of a person having quality of Loyal to duty are: sincere to one's duty and job, passionate about the work, faithful adherence to a cause, and allegiance to one's duty.

Tolerance: Tolerance is an inner strength which enables the individual to understand others. Major traits of a person having spirit of tolerance are: ability to develop deep understanding about any problem or situation, to give a thought to some bodies work, recognizing other religion, the ability to endure.

Flexibility: One's ability to cope with the changing needs or situations. Major traits of a person having spirit of flexibility are: working happily within all situations, adaptability to adaptive to any circumstances, easily persuaded etc.

Curiosity: A desire to find answers to questions or problems that comes on the way of day to day living. Salient features of a person having curiosity are: self- interest to know, of inquisitive in nature, spirit of asking question to self and others, to know something new, native to explore new things.

Environmental Ethics: One's self awareness about non harming attitude towards the nature. Essential characteristics of a person having environmental ethics are: respect for the

environment, understanding natures principle/laws, like to save environment, love for nature, and a person works to solve environmental problems.

Compassion: It is a state of feeling of oneness about somebody's problem. Major traits of a person having spirit of compassion are: feeling sympathetic for others, to help somebody, showing kindness to others, sympathizing deeply etc.

Gratitude: Individual's ability to express feelings honestly for the innumerable helps accepted from others. Salient features of a person having gratitude are: appreciating good work done to us by somebody, being grateful or thankful to others, deeply thankful to others for their help.

Quest for knowledge: A feeling of acquiring new idea or knowledge which leads a person to resolve some issues or problems. Salient features of a person having quest for knowledge are: exploring new knowledge or ideas, thorough investigation about anything, to establish the truth, passionate to understand the cause of anything, active partner in learning process, a noble goal.

Discrimination: It is the ability of an individual's will to keep oneself away from wrong practices. Major traits of a person having discrimination are: recognize difference, experimenting with self to arrive at logical conclusion, pattern of behaviour.

Honesty: It is an individual's ability of owning responsibility for wrong actions of oneself. Honesty comes through the core principle of truthfulness. Salient features of a person having honesty are: devoid of corrupt behaviour, act truthfully, think positively, thankful to self, refraining from lying etc.

Spirit of Inquiry: It is an individual's intention to search for cause (truth) of any problem when he is tempted by an external stimulus. Major traits of a person having spirit of Inquiry are: inquisitiveness, arguing with the self or the system in work. How things work ?

Co-operation: It is a quality of an individual to work happily with people and helping others as and when they require. Essential characteristics of a person having co-operation are: to be helpful to others, to accommodate every one's view in a given situation, add value to any collective views and task accomplishment, working together without personal ego, help without any hope, to help or share burden to relax others, help during difficult times.

Equality: Equality means treating all persons equally without any discrimination on the basis of caste, sex and physical abilities. Major traits of a person having equality are : treating others by looking towards their due, gender neutral attitude, caste – creed – colour neutral feelings in heart, no partiality towards anybody, no discrimination among group members working in a team, constitutional value, no superior feelings among group members.

Simplicity: A good feelings for others and respecting every one. Major traits of a person having spirit of simplicity are: live in natural way , no show up to others ,following principle of natural call of life, not adhering to fashion, simple thinking and living, attitude to accept the self, not living for others.

Determination: The innate nature of an individual to exercise his will freely so as to form a desirable habit. Essential characteristics of a person having determination are: strong will to achieve something, firmness of purpose, boldness in decision, serious intention.

Common goal: Working together and helping each other to attain larger purpose. Major traits of a person having spirit of common goal are: achieving public goal, working together without self-interest, be a part of social goal, working with winning spirit, shared goals by all, promoting national integration.

Dignity of labour: Respect for the work irrespective of gender. In other words it is an individual's outlook to treat every work or assignment respectfully. Essential characteristics of a person having dignity of labour are: respecting all people irrespective of their duties or jobs, respect for all occupations/professions, positive attitude towards physical work and mental work, no job is thankless.

Discipline: A way life where in the individual exhibit regularity and obeys codes of conduct. Salient features of a person having discipline are: strict follower of rule, self-awareness about the work or decision, net behaviour, to train/control self.

VARIABLES INVOLVED IN THE STUDY

The following variables will be considered for the above study.

Independent Variables: Type of teaching, Value Integrated Experiential learning, Conventional method of teaching

Dependent Variables: Value Conceptual Knowledge, Value Perception, and Achievement in Science.

DELIMITATIONS OF THE STUDY

The present study is made keeping in mind with the following delimitations.

1) The present study is delimited to the lessons of std. IX NCERT Science Text book from chapters like (*Ch.1: Matter in our surroundings, Ch.2:Is matter around us Pure ?, Ch.5: the fundamental Unit of life, Ch.6: Tissues, Ch.8: Motion, Ch.9: Force and Laws of Motion, Ch.10: Gravitation (Half Chapter only),Ch.15: Improvement in Food resources*)during term I of the academic year 2016-17.

2)In the present study value is delimited to: Learning to live together, Team work ,Loyalty to duty ,Tolerance, Flexibility, Curiosity, Environmental ethics, Compassion, Gratitude, Quest for knowledge, Discrimination,, Honesty, Spirit of inquiry, Co-operation, Equality, Simplicity, Determination, Common goal, Dignity of labour, and Discipline.

METHODOLOGY

The present study was a Experimental research and Quasi-Experimental research design was employed for the study. Controlled Group Pre-test, Post-test, design was followed. A value integrated Experiential learning (***ViEL***) intervention programme was developed and successfully implemented for teaching Science CBSE Std. IX students. The design of the present study is diagrammatically depicted below.

O1 X O2

O3 C O4

Where O1, O3 are Pre-Tests, O2, O4 are Post-Tests, X= Experimental Group,

C= Control Group

POPULATION AND SAMPLE

Sampling in educational research is generally conducted in order to permit the detailed study of part, rather than the whole of a population. The information derived from the resulting sample is customarily employed to develop useful generalizations about the population (Ross, 2005).

In this study population consists of all the CBSE students of class IX belonging to Navsari district in the state of Gujarat. A sample of convenience is the terminology used to describe a sample in which elements have been selected from the target population on the basis of their

accessibility or convenience to the researcher (Ross, 2005). The sample of the presents study consists of 37 students of Sri Sathya Sai Vidyaniketan & Sri Swaminarayan International School (SSIS), Eru, Navsari in the state of Gujarat, India. It was selected by adopting purposive sample technique.

Table 3.1 Sample Schools

School name	Experimental Group with no. of students	Control group with number of students
Shree Swaminarayan International School,Eru, Navsari	---------	37
Sri Sathya Sai Vidyaniketan, Ganesh Vad Sisodra, Navsari	37	----------

Background Variables

The following variables were considered the proposed study.

Independent variables: Value Integrated Experiential learning, Conventional method of teaching

Dependent Variables: Value Knowledge, Value Perception, Achievement in Science.

TOOLS FOR DATA COLLECTION

Tools for the present study

Serial Number	Objectives	Tools Prepared
1	To study the effectiveness of the intervention programme on integrated experiential learning approach for value inculcation in teaching science in terms of value conceptual knowledge, value perception and value practice of the taken values along with the achievement in science.	Value Perception Scale Value Knowledge Test, Achievement Test
2	To study the reaction of students towards the intervention programme on Integrated Experiential	Reaction Scale

	Learning approach for value inculcation in teaching science.	

Other Assessment tools used in the study were: Researchers Observation note, Teachers observation diary, Anecdotal record, Photograph.

DEVELOPMENT OF VALUE INTEGRATED EXPERIENTIAL LEARNING (ViEL)

According to **(Pitre, 2007)** there are six steps in experiential learning. (**3H Approach**)

In our experiential learning model consists of six steps which correspond to 6E viz.

Silent sitting ⟺ Enable
Topic initiation ⟺ Engage
Radiant thinking ⟺ Explore
Mind Mapping and web charting ⟺ Elaborate
Group Activity ⟺ Explain
Presentation ⟺ Evaluate

Step-I: **Silent sitting** (*Enable)* Silent Sitting for inner harmony .Learning happens in a conducive atmosphere where students are free to think and less stressed about the marks and grades. To make the child less stressed silent sitting for one to two minute is necessary for inner calmness which fosters creative faculty of the learner.

In this stage *teacher activity* is to: Maintain silence in the class, encourages inward look for all students.

Step-II: **Topic initiation** ***(****Engage*) The teacher gives a concept (one word) to the students, by writing it in the centre of the board. Here teacher establishes a context by giving an interesting/ stimulating activity by means of which the new concept can be explored. Teacher may say one key word or key concept of the chapter. Students are asked to think over it for 2-3 minute. This phase is intended to motivate students to capture their interest in the topic.

Active engagement involves inquiry, exploration, questioning, debates, application and reflection, leading to meaningful understanding, arriving at concept and creation of new ideas (NCERT, 2010).

Teacher Activity: creates interest, raises question, creates curiosity

Student Activity: Asks questions to self such as what do I already know about this ? Shows interest in the topic (Carin & Bass, 2000).

Step-III: **Radiant thinking *(Explore) :*** Teacher will ask all students to say words "related" to the topic. Write the words on the board and in their notebooks .There is no limit to number of words. In this way the interest of students are captured through some motivation by giving them feeling of considering them as valued key player in learning process, consideration of their own knowledge. Within this phase, the ideas of students are accumulated for clarification by the learner with the help of the teacher. The purpose of this phase is the determination of the prior conceptions" What do you know about ….?(Suresh, 2012).

In this phase teacher: Work as guide, coach and facilitator, observes and listens to students as they speak new words, provided time & motivation for whole class involvement, act as a consultant for the class.

Student Activity: Think freely but within the time frame, records ideas /words, suspends judgment (Carin & Bass, 2000).

Step-IV: **Mind Mapping & web charting** (*Elaborate)* : Organize the class into groups of 5-7 children. Ask the groups to "categorize" the Words and prepare a Web-chart. Necessary explanation and meanings of scientific terms are provided to students by the teacher in order to help them develop their own ideas. Here students have the opportunity to express what they know about the unit topic or concept so that they can make connections between what they know and the new ideas being introduced.

Step –V: **Group Activity** *(Explain)***:** Once the final web chart is decided, organize the class in groups, according to the number of categories. Students explore problems or phenomena through hands on activities , using their own language to discuss ideas. This exploration provides a common set of experiences which allow the new ideas to make sense. The new ideas are applied to new situations and problems through student's discussion and analysis. This step help each leaner for self construction of concept(s).

***Step-VI: Evaluate*:** Each group performs a Pre-Presentation of their work, in front of the Class. Children are asked to describe what they have done and discovered. This increases deeper understanding about stated values and corresponding scientific skills. Students apply what they

have learnt to new situations. Students evaluate what they have learnt and learning is assessed. Ideas of students are challenged and compared with evidence from the scientists view.

Student Activity : Replies open ended questions by using observations, evidences(Carin & Bass, 2000).

In ViEL, constructivist philosophy lays emphasis on learners‟ need to build their understanding of new ideas through self-experiences. Much has been described by stalwarts of educational thinkers like John Dewy, Jean Piaget, Eleanor Duckworth, George Hein etc. from time to time and ViEL conforms its alignment to previous theories. The ViEL pedagogy has its core form 5E model and tends to be like a 6E model with ***enable, engage, explore, elaborate, explain, and evaluate*** which lies in between 5E and 7E model. The first step of the ViEL pedagogy is ***Enable*** i.e through silent sitting the learner need to attain mental equilibrium which is very much needed for the science learning. In second phase the teacher establishes a context by giving an interesting/ stimulating activity by means of which the new concept can be explored. The teacher may say one key word or key concept of the chapter. Students are asked to think over it for 2-3 minutes. This phase is intended to motivate students to capture their interest in the topic i.e ***Engage***. Few ice breakers or stimulus was given to learners to bring their focus on the concept. In third phase, teacher will ask all students to say words "related" to the topic and they will write the words on the board and in their notebooks. In this way the interest of students are captured through some motivation by giving them feeling of considering them as valued key player in learning process which is nothing but ***Explore.*** Here, science teaching strategies like group activities, storytelling, laboratory activity, brain storming activity and value inculcation strategies like Value games, role plays etc. are incorporated by students in consultation with teacher. In fourth phase, teacher divides the class into groups and asks them to "categories" the words and prepare a Web-chart. Necessary explanation and meanings of scientific terms are provided to students by the teacher in order to help them to develop their own ideas i.***e Elaborate***. In fifth phase students have the opportunity to express what they know about the unit topic or concept so that they can make connections between what they know and the new ideas being introduced thereby ***explain*** the concept they understood. Finally they make presentation in groups which ***evaluates*** their learning. In this ViEL pedagogy both indoor and outdoor activities were interwoven so as to give learner a good chance of enhancing their content knowledge, presentation skills and understanding Science.

PROCESS OF DATA COLLECION

The investigator conducted the experiment in order to find out the impact of value integrated experiential learning on Teaching Science to standard IX CBSE students from 1st April 2016 to 30th September 2016 (CBSE Term I). Total sample strength of experimental group was 37 & control group was 37.The whole process of experiment consisted of three phases namely,

Pre Test Phase:

A pre-test was conducted to experimental group and the control group at the same time. All four tools namely Value Knowledge test, Value Perception scale, Reaction scale and achievement test were administered to both experimental group and control group. Time was carefully noted for all the four tools. In fact Value knowledge Test and Value perception scale was administered phase wise five values per session.

Experiment Phase:

Students of experimental group were given treatment by using ***ViEL*** method which comprised of six steps. The investigator made PowerPoint presentation about the steps in experiential learning the philosophy and its benefits to students to learn science along with values. Value game, group activity, presentations, famous speeches of Scientists, group discussions were held as part of ***ViEL***. Each cycle of experiential learning took six periods and the last period was allotted for presentations by all groups. The investigator used all possible techniques like; science lab sessions, science video clippings, personal reflection, filed visit, etc to impart the value inculcation skills necessary for their life. The participants took active part in all sessions. After every session, the investigator asked for the feedback and received the feedback about ***ViEL*** sessions from the participants. That helped him to organize the next experiential learning cycle in a more meaningful and fruitful way.

Post Test Phase.

After the experiment a post -test was conducted in both Experimental group and control group by using four tools at the same time. The responses from the groups were collected for analysis.

DATA ANALYSIS

The data for the present study were obtained with the help of various tools such as, achievement test in Science, value perception test, value knowledge test and reaction scale. The collected data were statistically analyzed as per the objective of the study. In the present study, data analysis is done quantitatively with the help of statistics like, Mean, Standard deviation, Standard errors of Mean, Mann-Whitney U-test and the Intensity Index.

MAJOR FINDINGS

Data analysis and its interpretations enabled the researcher to elicit major findings of the study which are explained as follows.

1. The intervention programme on Value Integrated Experiential learning (ViEL) was found to be significantly effective in terms of enhancing value conceptual knowledge of students in all the taken values except the values like: co-operation, simplicity, determination, honesty, common goal, discrimination, discipline, flexibility, loyalty to duty , team work and learning to live together
2. The intervention programme on Value Integrated Experiential learning (ViEL) was found to be significantly effective in terms of enhancing value perception of students in all the values except the values like: tolerance, simplicity and discrimination.
3. The intervention programme on Value Integrated Experiential learning (ViEL) was found to be effective in terms of reactions of students towards the programme as most of the students showed favorable reaction towards most of the components of value integrated experiential learning.
4. The intervention programme on Value Integrated Experiential learning (ViEL) was found to be effective in terms of value actualization of students in all the taken values as these values were reflected in their activities.
5. The Science achievement of the students learned Science through Value Integrated Experiential learning (ViEL) was equal or more in comparison to the achievement the students of the control group in Science. It showed that ViEL had no negative impact on the achievement of students in Science.

DISCUSSION

The value Integrated experiential learning was found effective in developing value conceptual knowledge about nine values like: *Tolerance, Curiosity, Compassion, Environmental ethics, Gratitude, dignity of labour, Spirit of inquiry, equality and Quest for knowledge* in students of standard IX. This is due to ViEL in which students were exposed to various activities conducted in classes for each value such as value songs, storytelling, value quiz, debate on scientists life history, making of value logo, scrap book activity for values etc. These values were properly integrated with the content through suitable story and anecdotes. This finding is supported by Arora (1993) & Kapoor (1995) whose studies were based on „ relationship between the nature of scientific knowledge and values". However, it was found that the value integrated experiential learning was not found to be effective in inculcating value conceptual knowledge for values like co-operation, simplicity, determination, honesty, common goal, discrimination, discipline, Flexibility, , loyalty to duty , team work and learning to live together . One of the reasons could have been that less time was invested to develop an understanding and clear knowledge about those values as there exists several conflicting situations in our daily life starting from home to school where in child is confused to pick up the right one.

The value Integrated experiential learning was found effective in developing the perception about seventeen values like: equality, co-operation, dignity of labour, determination, honesty, common goal, curiosity, quest for knowledge, discipline, environmental ethics, spirit of inquiry, gratitude, compassion, flexibility, loyalty to duty, team work and learning to live together in students of standard IX. One of reasons could be due to various activities conducted in classes for each value and making of value logo, anagram making, value tree and key making, scrap book activity for values, value story discussion. These values were properly integrated with the content through suitable story and anecdotes about scientists. This finding is supported by Biswal & Srivastava (2006) whose study related to development of values through CCA programme and intervention curriculum for value development of Bajpai (1990).However the Value integrated experiential learning was not found to be effective in inculcating perception for values like tolerance, simplicity and discrimination, though means for those values for experimental group was higher than control group students**.** One of the reasons could have been that more time may be required to develop perception about these values.

One of the striking observation indicates that ViEL did not able to inculcate value knowledge and value perception among experimental group students in the values like simplicity, and discrimination though their mean scores were higher than control groups. The possibilities may be ascribed to changing life styles of people in present society where complexities are more than simplicity and everybody is in hurry to achieve their success quickly without thinking about the pros and cons of the matter. Probably we have lost our divine inner self consciousness about the power of values like: discrimination and simplicity as both these values are eternal and part of our cultural heritage.

In nutshell ViEL process all three domains like cognitive, affective and psychomotor domains were deeply engaged which was reflected from the results obtained in value conceptual knowledge, value Perception and achievement test. Therefore it can be concluded that ViEL in Science strategy as a whole was significant in terms of its objective which is supported strongly by Smith et al (2008) & Danhui et al (2012) in their respective experiential learning studies i.e Integrated Experiential Learning Curriculum (IELC) and integration of SMART board has shown promise for improving students and teachers' attitudes about teaching science .

SUGGESTIONS

Study should be conducted to expand this value integrated experiential learning (***ViEL***) to other subjects and for other values like: Universal Human Values, Global citizenship conduct, Human rights, multicultural values, Environmental sustainability virtues etc.

Similar study can be conducted for other Indian boards like 18 state boards, ICSE, and international boards like Cambridge and IGCSE those are having pan India presence.

The instruments used such as Value Knowledge test , Value Perception scale, to measure the overall effectiveness of ***ViEL*** programme in teaching science can be standardized so that it can be extended to all schools across the boards of India for the value inculcation and its quantification.

According to Stewart (1985) over the past ten years cognitive science has emerged as a dominant perspective in psychology. This new view brings together researchers with overlapping interests from the fields of artificial intelligence, psycholingu-istics, psychology, epistemology, education

and neurophysiology, ***ViEL*** may be tried out in consonance with above emerging fields which is having its bearings in our schooling systems in 3rd decade of 21st century.

CONCLUSION

The ViEL approach was successful in developing value conceptual knowledge, value perception and value actualization in all most all selected values. ViEL has the ability to transform education through inculcation of value conceptual knowledge, value perception and value actualization. It can break the monotony, boredom of the class in many ways. The ViEL can play a meaningful role for the majority of students in 21st century Science education in general and secondary science in particular. For that reason, it is essential to evolve and incorporate ViEL learning settings in regular syllabus for awakening students' fascination for science again and again. Therefore, Science teachers may be trained in ViEL mode for teaching Science. The findings of ViEL support building teacher competencies and nurture them as transformation agent. The findings of the present study can also be used for the development of instructional materials for the teachers and value based science learning materials for students in ViEL way. This type of model for teaching science can develop better outlook for science and develop more clarity of concepts which will sustain for a longer period of time for effective learning of Science.

The results of the study also support that ViELis an effective tool to engage students in higher order thinking level of cognitive process. Thus ViEL offers a platform of learner centered and learning centered classroom where in every one would want to be and could be both teachers and students. In this context ViELoffers a plausible solution in teaching secondary school science and its major features will be among the valuable views of science education even after the term activity based learning will have gone out of fashion. The sky is the limit and there is a strong need to reinvigorate science teaching with objective of value inculcation through experiential learning endowed with a strong research support.

With the renewed emphasis on learning by HRD ministry through learning outcome document for standard I to VIII, it is clear that in Indian education system good days will come for which necessary impetus to be given at secondary school science education (i.e adoption of Integrated

Experiential learning strategy) which will augur multipronged effect in term of, enhancing learning outcome, overall renewal of quality of secondary science education in the country.

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