Chapter I

Conceptual Framework

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1.0. Introduction

Report of the Education Commission proposed internal transformation of the educational system so that it relates to the life, needs and aspirations of the nation. The realization of the country's aspirations involves changes in the knowledge, skills, interests and values of the people as a whole (Education Commission, 1966). Education has fundamental role in the development of human beings. Education is for the all round development of all. The goal of education is realization of all the possibilities of an individual not only for the self but also for the changing society. To educate people is to empower them. According to Bloom's Taxonomy indicators of empowerment are development of various domains, namely, Cognitive, Affective, and Psychomotor. Education is a dynamic concept as it appears to be of a different nature from various angles. Mahatma Gandhi - Father of our Nation had a wholistic view of Wholistic Education. In his words "By education I mean all round drawing out of the best in child – body, mind and soul." The development of social intelligence, emotional intelligence and physical aspect of personality are also as vital as the development of mental ability. Education is to realise all round development which can be done by developing capacities of human beings, such as, affective, psychomotor, health and environment and spiritual along with cognitive. Education cannot be considered in isolation or planned in a vacuum. It has to be used as a powerful instrument of social, economical and political change which is essential for life. Education plays an important role in preparing the citizens by providing various means for healthy life, such as, knowledge, skills, values, attitudes and spiritual control.

Teaching-learning process plays a crucial role in education. Teaching is both science and art. Science explores and art expresses. Teaching explores scientifically and designs, develops, constructs and communicates artistically. Teaching process includes various approaches for providing learning experiences. These approaches are classified as either teacher centred approaches which include methods, such as,

lecture, lecture cum demonstration, team teaching, or student centred approaches which include methods, such as, laboratory, project, heuristic and assignment. Education Commission Report (1964-66) projected Science Education as "It must become an integral part of school education; and ultimately some study of science should become a part of all courses in the humanities and social sciences at the university stage, even the teaching of science can be enriched by the inclusion of some elements of the humanities and social sciences. The quality of science teaching has to be raised considerably so as to achieve its proper objectives and purposes, namely, to promote deep understanding of basic principles, to develop problem-solving and analytical skills and the ability to apply them to the problems of the material environment and social living, and to promote the spirit of enquiry and experimentation. Only then can a scientific outlook become part of our life and culture."

In the present era, education is more oriented for development of cognitive domain (head) in comparison to the affective domain (heart) and the psychomotor domain (hands). Even in developing cognitive domain tons of information/knowledge is being loaded and ignoring the other aspects of cognitive development. So, there is a need of wholistic education for developing all the three faculties (head, heart and hands) and relating education with real life and environment. The education system should emphasize the development of fundamental social, moral and spiritual values. Pandya (2007) recommended seven spiritual qualities for a person, namely, trust, ideals, honesty, ethics, discipline, regularity and commitment. These qualities will help a person in all walks of life for the development of spiritual intelligence. For the development of an individual as a whole there is a need of wholistic approach in education.

1.1. Wholistic Education

Berg (2010) outlined the components of Wholistic education, such as, active learning, deep understanding, critical and creative thinking, along with an emphasis on social relationships and realising the fullness of human existence. Wholistic education is a philosophy of education and concerned with the development of every person's intellectual, emotional, social, physical, and spiritual potentials. Wholistic education does not exist in a single, consistent form. It is best described as a group of beliefs, feelings, principles and general ideas that share a family resemblance (Forbes, 2003).

Report of Education Commission (1964-66) has recommended cultivating social, moral and spiritual values as one of the important aims of Education. Further, Miller (1999) has been of the view that "Wholistic Education is based on the premise that each person finds identity, meaning and purpose in life through connections to the community, to the natural world, and to spiritual values such as compassion and peace." The wholistic education places significance on relationships and primary human values within the learning environment (Martin, 2003). Wholistic education focuses on the fullest possible development of the person, encouraging individuals to become the very best or finest that they can be and enabling them to experience all they can from life and reach their goals (Forbes, 2003). The vision of Wholistic Education must be to organize a child for a satisfying and fruitful life in which their skills and attributes will continuously challenged, developed and applied as part of their lifetime education.

Forbes & Robin (2004) divided wholistic education into two categories: the idea of Ultimacy and Basil Bernstein's notion of Sagacious Competence.

Ultimacy

1. Religious as in becoming "enlightened". Spirituality is an important component in wholistic education as it emphasizes the connectedness of all living things and stresses the harmony between the inner life and outer life
2. Psychological as in Maslow's "self actualization". Wholistic education believes that one should strive to be all that one can be in life. There are no deficits in learners, just differences.

A person developing to the ultimate extent moves towards the highest aspirations of the human spirit.

Sagacious Competence

1. Freedom (independence, "inner liberation").
2. Good judgment (self-governance and autonomy).
3. Meta-Learning (individuals learn in different way).
4. Social Ability (learning more than social skills).
5. Refining Values (development of character).
6. Self Knowledge (encompasses more subtle learning of the nature of oneself).

From the above views, features of wholistic education could be derived as follows:

1. Wholistic education emphasises on interconnectedness and the focus is on understanding of relationship rather than merely the study of parts.
2. Wholistic education focuses on development of all the domains i.e. cognitive, affective, psychomotor, health and environment, and spiritual.
3. Wholistic education aims to nurture humane qualities/ humanity in human beings for peaceful coexistence.
4. Wholistic education connects past, present and future.

1.2. Wholistic Approach

Concept of wholistic approach is that the totality of something which is much greater than the sum of its component parts and their functioning i.e. the whole cannot be understood by the isolated analysis of their parts and their function rather the whole is integrated functioning of all the parts. So the wholistic approach is not a new approach rather it includes approaches such as Naturalistic approach, Pragmatic approach and Constructivist approach. The wholistic approach includes methods, such as, project method, supervised study method, and experimental method. Wholistic approach is the way of teaching subject as a whole by considering all aspects of the curriculum with a purpose of wholistic development of the students. Wholistic approach considers curriculum as a whole and transaction of it that leads to wholistic education. The approach comprises of interdisciplinary subjects and integration of content within the subjects and with different scholastic subjects, real life situation, environment, values and social surrounding. The content also caters to knowledge of cognitive domain, affective domain, psychomotor domain and spiritual. In the wholistic approach development of students should be based upon development of all the domains. Thus, wholistic approach emphasises on development of all the domains i.e. all round development. Wholistic approach enables students to perceive and understand the various contexts that shape and give meaning to life (Panigrahi & Rajendran, 2008). The wholistic approach enables students to explore their own potential and that of surroundings in an integrated way.

Maheshwari (2010) has defined holistic approach as an essential element to educating students which one seeks to open the mind, nurture the spirit and awaken the heart. Key concepts of such an approach include fostering a passion for learning and

nourishing the sense of wonder. Holistic Approach is one where the education is going beyond narrow focus on the intellect; where every child is more than the future employee and every intelligence and the score or marks one receive on tests.

Wholistic approach could be implemented as below

Problems from real life → Practice → Discussion → Concept formation

Steps to be followed for wholistic approach

1. **Problems from real life:**

   In this step students will be introduced a problem which they encounter in real life situation.

2. **Practice:**

   Understanding of problem, gathering information to solve the problem through various activities based on problem and come to the conclusion.

3. **Discussion:**

   The conclusions will be discussed among peers, teachers through cooperation and collaboration.

4. **Concept formation:**

   At the end of the discussion students will come to the general conclusion and the student will formulate concept.

From the references researcher has defines the Wholistic approach as follows:

Wholistic Approach is a study of inter-connectedness, inter-dependence and inter-relatedness of various aspects. It is to observe a learning experience as an integral function of all the functional units. Wholistic Approach starts dealing with Education in various ways to achieve Wholistic Education, realizing inter-connectedness and inter-dependence, zooming in and zooming out. Wholistic Development can be achieved through Wholistic Education which is comprised of Cognitive Development (Thinking Skills), Affective Development (Social and Emotional Skills), Psychomotor Development (Mind and Motor Muscles coordination Skills), Spiritual Development (Spiritual control skills, coexistence of Self and Selflessness), Health and Environment (Skills of observing sound health & universal being, healthy relationship between sound Self and surrounding atmosphere, healthy web of nature and society).

Wholistic Approach can be presented by the following diagram:

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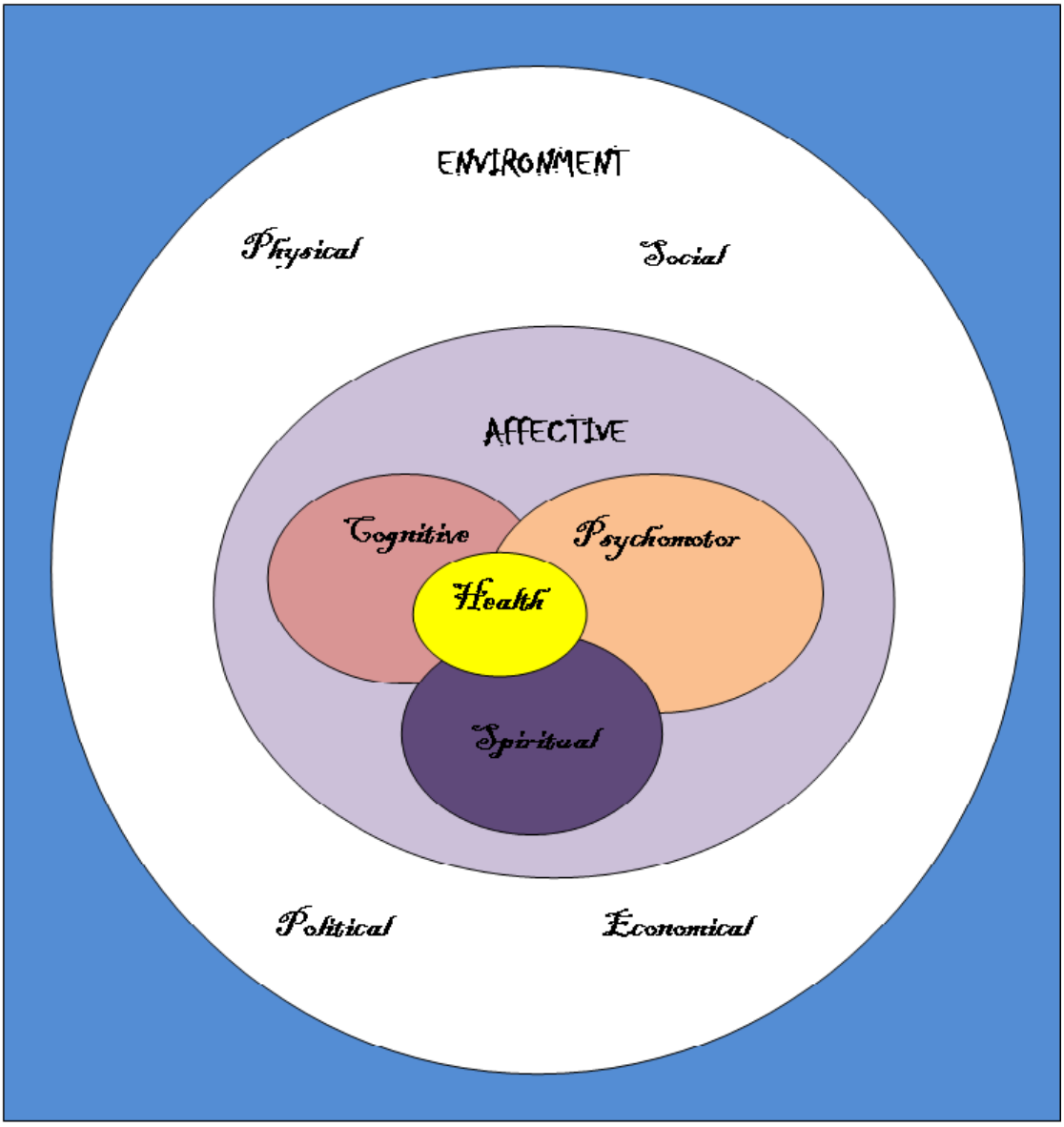

Fig. 1.1.: Diagram of Wholistic Approach

1.3. Need of Wholistic Approach

With a growing body of world research emphasizing the importance of wholistic approach to education, early childhood educators are being challenged to incorporate a teaching practice that focuses less on the traditional milestones of academic development, and more on the complete physical, emotional and psychological wellbeing of a child (UNESCO, 2006). The researches show that over time, even persons with average IQ (Intellectual Intelligence) but with high EI (Emotional

Intelligence) are significantly more successful than those with much higher IQs but low EI (Goleman, 2006). Specialisation is an antithesis of Wholistic Approach. In specialisation there is rare consideration for inter disciplinarily. Teaching should be such which provides knowledge in integrated way. Teaching style should be wholistic i.e. taking content as a whole not as parts. Indian culture is denoted by values of Wholism. Swami Vivekananda also proposed Wholistic Education. In his words "Education is the manifestation of the perfection already in man." Today's Education System mainly concentrates on cognitive domain and rarely on other domains. Different subjects should be taught keeping in mind the development of cognitive, affective, psychomotor, spiritual, health and environmental domains wholistically.

1.4. Wholistic Achievement

The cognitive skills gained through core academic coursework are critical, but it is equally important to develop the social and emotional skills essential for full, healthy and meaningful life. Wholistic Achievement is measured in various domains, namely, Cognitive, Affective, and Psychomotor, Spiritual, Health and Environment. Very often in the scholastic achievement as certified is representative of the cognitive domain or at the most psychomotor domain. The cognitive achievement is limited to knowledge or at the most understanding higher cognitive abilities are rarely developed and tested. There should be adequate scope for development of communicative, creative, reflective & critical thinking and problem solving ability. The educational experiences could be situation based, activity based, performance based related to reality at grass root. Rarely there is an expression of the affective domain. There should be adequate focus on development of affective domain on factors, such as, empathy, impulse control, communication and co-operation, optimism, emotional self-awareness, self assertion, effective relationship, adjustment, resilience, constructive discontent. Emotions represent self-sensitivity and sensitivity towards the environment. It is empathizing through interpersonal relationships through social skills, such as, mutual trust, co-operation, loyalty, appreciation, attachment, responsibility, sharing, sensibility, sensitivity, openness, love, affection, friendliness, fellow-feeling and patriotism. Emotional Quotient may be expressed as

$$EQ = \frac{Actual\ Adjustment}{Expected\ Adjustment} \times 100$$

Similarly, spirit is the ultimate controlling power in us which controls all our thinking and action could there be added focus on dimensions, such as, God and relation, self-awareness, value based practices, Equality (Gender, caste etc.), Fate-ism, social relationships, divinity and love, leadership, helping and integrity. Spiritual Quotient may be expressed as

$$SQ = \frac{Manifested\ Conscience}{Expected\ Conscience} \times 100$$

Health development, Environmental Awareness and Ethics will be estimated through Physical and Mental health and environmental sensitivity enhancement.

1.5. Teacher Education

Teacher has capability to lead community and nation for better life and humanity. For that a teacher has to be enlightened, empowered and emancipated. Teacher shapes future of the students, such as, teacher can make IAS officer, IPS officer, pilot, engineer, doctor, painter, musician, scientist, politician, teacher and above all human being. Teacher finds inner abilities of students and gives them guidance to cultivate these. NCF 2005 stated "No system of education can rise above the quality of its teachers, and the quality of teachers greatly depends on the means deployed for selection, procedures used for training, and the strategies adopted for ensuring accountability."

Teaching is a noble profession where teacher is a product and teacher education is a process for development and preparation of teachers. The qualities of teachers directly depend upon quality of teacher education programme (NCF, 2005). Teacher education has precious role in the life of a teacher, because, it fosters values in teacher, such as, ideal, discipline, curiosity, innovation, ethics and rhythmic life. Teacher education must prepare teacher for teaching, pedagogical and development of skills required for all the phases of life. The ultimate aim of teacher education is to prepare effective teachers who are competent enough to bring out desired all round change in students.

The general objectives of teacher education are (Curriculum Framework for Quality Teacher Education, 2009) to,

- Promote capabilities for inculcating national values and goals as enshrined in the Constitution of India.

- Enable teachers to act as agents of modernization and social change.
- Sensitize teachers towards the promotion of social cohesion, international understanding and protection of human rights and rights of the child.
- Transform student-teachers into competent and committed professionals willing to perform the identified tasks.
- Develop competencies and skills needed for becoming an effective teacher.
- Sensitize teachers and teacher educators about emerging issues, such as environment, ecology, population, gender equality, legal literacy.
- Empower teachers to cultivate rational thinking and scientific temper among students.
- Develop critical awareness about the social realities.
- Develop managerial and organizational skills.

Depending upon the type of the training and education provided to novice teachers before and after a teaching job the teacher education program is organized into two different kinds:

i. Pre-service teacher education

ii. In-service teacher education

1.5.1. Pre-Service Teacher Education

Pre-service teacher education programmes are the programmes for professional preparation of teachers. Pre-service teacher education is the programme which is offered to the students before they join teaching profession and leads to a degree and certification, to make a person eligible to join teaching profession.

1.5.2. Objectives of Pre-Service Teacher Education Programmes

Mangala (2001) has suggested objectives of pre-service teacher education programme as follows:

1. **<u>Knowledge and understanding of</u>**

- The Indian socio-cultural context and the role of education in national development.

- The process of human development and learning in all its dimensions and its implications to education.

2. <u>Professional competencies and skills relating to</u>

- Effective communication
- Effective curriculum transaction, utilizing learning resources of various kinds and employing interactive teaching learning strategies to promote all round growth of learners.
- Comprehensive and continuous evaluation of learner's progress through appropriate tools and techniques.
- Effective management of learning within and outside the classroom to maximize learners' growth.
- Catering to the learning needs of special groups of children like the gifted, the slow learners and the disabled.
- Organising curricular activities of different kinds to promote all round growth of children.
- Offering guidance to students in their personal, academic and occupational problems.
- Research and experimentation in education.

3. <u>Social commitment through participation in</u>

- Developmental activities in the community, extension activities and community service.
- Complementary and parallel educational service systems like non-formal education, adult education, workers education.

4. Positive attitude towards children, learning, school, professional growth and manual work.

5. Social, cultural and moral values, such as, democracy, secularism, scientific temper, egalitarianism, cultural heritage, conservation of the environment, civil responsibility oriented towards unity and integration of our people.

6. Aesthetic interests and appreciation towards – literary, cultural and artistic pursuits.

1.6. Importance of Teaching of Science at B.Ed. level

Scientific and technological progress provides knowledge of new methods of production which enlarge the area of capitalistic production methods. Therefore, scientific and technological progress has maintained an important role in the growth of human society. The scientific and technological instruments of a country also affect the determining elements of economic development. The country, where the standard of these elements are higher, will be having the fast speed of development. The evaluation of the situation of any nation can be made by the standard of scientific and technological means also. A main method of the proper circulation of social arrangement is the development of scientific view point among people. Scientific view and science education help people to find out scientific bases of phenomena and not to be a victim of superstitions.

1.7. Present Scenario of Science Education and Science Teaching

There are so many recommendations of various commissions since before independence and after independence, but, science education is still lacking. Recommendations of various commissions on science education are, such as, Macaulay's Minute on Education (1835), Wood's Despatch (1854), Indian Education Commission (1882-83), Zakir Hussain Committee (1938), Sargent Report (1944), Secondary Education Commission (1952-53), Tara Devi Report (1956), Indian Education Commission (1964-66), The National Policy on Education (1968), The National Policy on Education (1986), Ishwarbhai Patel Commission (1977), Nation Curriculum Framework (2000), National Curriculum Framework (2005), National Curriculum Framework Review (2005). Earlier various commissions had recommended for promotion and inclusion of science education at various levels. They are, such as, money should be provided for introduction and promotion of knowledge of science among the inhabitants of the British territories, science education needs attention and promotion, encouragement of science education at all levels, fostering scientific temper, inculcation of accurate observation skills and testing experience by experiments, inclusion of General Science at middle and secondary level and pure sciences and applied sciences at high school level. After inclusion of science education at various levels there are some recommendations for quality improvement of science education. There are, such as, inspire students through

stories about scientists and their discoveries, method of science teaching should be modified by giving stress on investigatory approach and understanding of basic concepts, importance of quality in science education, provision of science kit and science equipments for quality improvement of science education at various level, students should acquire process skills, science teaching should engage learners acquiring methods and processes that will nurture their curiosity and creativity.

There are so many recommendations by various commissions and committees but even then there is lack of science teaching and science education. Science education is a process for developing scientific temper, scientific attitude and scientific knowledge, which can be used in day to day life. Studies, namely, Vaidya (1997), Malhotra (1998), Umashree (1999), Bhide (2002), Kumar (2004) and Shelat (2013) revealed that science is still taught through lecture method rather than student centred method. During science teaching students are passive recipients. They are not getting opportunity to do things individually on their own.

Science should be taught in such a manner that the students apply the concepts of science in day to day life and understand the significance of science in life. Science is a subject which is interrelated and interconnected with other subjects, such as, mathematics, social science, economics, geography, psychology, and economics. So, Science should be taught in interrelated ways.

1.8. Wholistic Approach Teacher

For teaching through wholistic approach teacher should be as a mentor, a facilitator, and a companion (Forbes, 1996). For wholistic approach teacher should raise issues or problem from reality. For resolving issues or solving problems open and honest sharing is expected amongst teachers and students. Different abilities of individuals are respected and appreciated by the teacher. The reward of helping one another and growing together should be emphasised by teacher. For imparting knowledge through wholistic approach problem/issue should be identified first. Efforts for solving the problem should be made by considering all the aspects of the problem. Teacher should be a researcher, because, teaching of science and research are synonyms. This will lead to wholistic development of the students.

1.9. Skills required for Teachers to teach through Wholistic Approach

1. **Perception Skill**
    1) Skill of Closure and Pragnanz
    2) Skill of Proximity
    3) Skill of Grouping and Classifying
2. **Cognitive skill**
    1) Skill of Synthesis
    2) Skill of Integration
    3) Skill of Analysis
    4) Info-savvy Skills
    5) Micro Teaching Skills
    6) Science Process Skills
3. **Psychomotor skill**
    1) Mind and Motor Muscles coordination skills
4. **Life skill**
    1) Human Development Skill/ Social Skill
        1. Self-awareness
        2. Empathy
        3. Inter Personal relationship
        4. Communication Skill
    2) Emotional skill/ Affective Skill
        1. Skill of Coping with Stress
        2. Skill of Coping with Emotion
    3) Thinking Skill
        1. Critical Thinking
        2. Creative Thinking
        3. Decision making

4. Problem Solving

5. **Health and Environment Awareness Skill**

    1) Skills of observing sound health and universal being
    2) skills for healthy relationship between sound self and surrounding atmosphere
    3) Skills for healthy web of nature and society

6. **Skill of Spiritual Development**

    1) Skill of Differentiation and Reconciliation
    2) Skill of Interconnecting and Interdependence
    3) Skill of coexistence of self and selflessness
    4) Spiritual Control skill

1.10. Science Education

According to Dewey (1916) the heart of Science lies not in the conclusions reached, but in the method of observation, experimentation and mathematical reasoning by which conclusions are reached. Science education has added new dimensions to life and education. The goal of Science education is that students should achieve scientific literacy. The scientific literacy is "The knowledge and understanding of scientific concepts needed in daily living. Scientific literacy enables students not only to use scientific principles and processes in making personal decisions but also to participate in discussions of scientific issues that affect society. Understanding scientific knowledge and processes contributes in an essential way to these skills. The economic productivity of society is related to the scientific and technological skills of the people" (Yager, 2010).

1.11. Nature of Science

Science word is originated from Latin verb 'Scere' meaning 'to know' and Latin noun 'scienta' meaning knowledge. Science can be defined as 'The systematic observation of natural events and conditions in order to discover facts about them and also to formulate laws and principles based on these facts'. Science is both a body of knowledge and the process of acquiring it (Fitzpatrick, 1960). Nature of science can be identified by three basic principles, i.e. an accumulated and systematized body of

knowledge, the scientific method of inquiry and the scientific attitudes. Science is both product as well as process. Scientific knowledge is based upon facts, concepts, generalizations, theories and laws. The American Association for the Advancement of Science (AAAS) provided thirteen processes for the scientific inquiry. Namely, Observation, Classification, Number relations, Measurement, Space/Time relations, Communication, Prediction, Inference, Making operational definitions, Formulating Hypotheses, Interpreting Data, Identifying and controlling variable and Experimenting.

1.12. Aims of Science Education

NCERT Focus Group (2005) focused on wholistic education and summarized that Science Education should enable the learner to

1. Know the facts and principles of science and its applications, consistent with the stage of cognitive development.
2. Acquire the skills and understand the methods and processes that lead to generation and validation of scientific knowledge.
3. Develop a historical and developmental perspective of science and to enable the learner to view science as a social enterprise.
4. Relate to the environment (natural environment, artefacts and people), local, as well as, global, and appreciate the issues at the interface of science, technology and society.
5. Acquire the requisite theoretical knowledge and practical technological skills to enter the world of work.
6. Nurture the natural curiosity, aesthetic sense and creativity in science and technology.
7. Imbibe the values of honesty, integrity, co-operation, concern for life and preservation of environment.
8. Cultivate ‘scientific temper’-objectivity, critical thinking and freedom from fear and prejudice.

Thus, science education is to develop human beings for peaceful coexistence in the world.

1.13. Importance of Science in Everyday Life

Science plays tremendous role in human life. Sankhala (2007) said that man is able to conquer time and distance with the help of Science. It saves mankind from doing excessive hard work. The cloths, the facilities available in home and office, the agricultural methods which help in producing food, electrical appliances used in home, such as, lamp, mobile, laptop, plasma television, palmtop are based on scientific principles. Science is changing entire existence in various aspects, such as, health, communication and transportation. Science has helped in giving eyes to blind, hearing to deaf and legs to lame. Science improves the quality of human life. Life is full of activities; individual makes use of various technologies and there is science involved in everything, like, cooking, walking, writing, medicine and different systems of body. Science is very useful in routine life. Kumar (1999) stated that Science provides systematic and organised information comprising scientific facts, concepts, generalisation, laws and theories which may prove helpful in enhancing the span of knowledge but also in finding the solution of problems.

1.14. Wholistic Approach in Teaching of Science

Wholistic approach deals with all the domains, such as, cognitive, affective, psychomotor, health and environment, and spiritual. Science is a discipline where students learn many laws which are related to their routine life. In the study of Science students are doing practical and by that they can experience success and failure. The aim of wholistic education is developing student as a whole not as part. While imparting knowledge through the wholistic approach, the curriculum should be such that it takes care of development of all the domains. Through the Science subject, development of affective domain is done because in curriculum there are so many topics related to self, relationship, health and environment. The students are able to learn and feel the environment. Also spiritual Qualities can be developed through Science.

1.15. Rationale for the Present Study

Jiddu Krishnamurti anticipated education as “understand the whole of life, not just one little part of it”. Integrated activities of an individual are inter-related and inter-connected with each other which determine the whole. Education aims at realizing the

whole. Healthy life demands understanding of the whole, irrespective of the disciplines we belong to. So, teaching-learning ought to be wholistic rather than fragmented and scattered bits of information. So, the execution of educational activities demands Wholistic Approach of teaching.

The inquiry and imaginative human mind has responded to the wonders and awes of the nature in different ways. One kind of response from the earliest time has been to observe the physical and biological environment carefully, look for any meaningful pattern and relations, make and use new tools to interact with nature, and build conceptual models to understand the world. This human endeavour is called science. Science is a dynamic, expanding body of knowledge covering every domains of experience. Scientific method involves science processes, which plays an emancipative role in the world.

National Curriculum Framework (2005) has emphasized on science processes such as observation, looking for regularities and patterns, making hypotheses, devising qualitative or mathematical models, deducing their consequences, verification or falsification of theories through observations and controlled experiments, and thus arriving at the principles, theories and laws governing the natural world. If these processes are observed in integrated way then the wholistic education could be realized. Further, NCF (2005) suggested reforms in science teaching and emphasis on the meaning making learning rather drilling of the content and rote learning. This demands that teaching-learning process should have wholistic approach that integrates interconnected and interdependent content with life, environment and wisdom. Thus, by using wholistic approach in science education teacher could realize wholistic development.

NCFTE (2009) reported "The level and quality of subject matter knowledge, the repertoire of pedagogical skills that the teachers possess to meet the needs of diverse learning situations, sensitivity to contemporary issues and problems and also to learners and the level of motivation critically influence the quality of curriculum transaction in the classrooms and thereby pupil learning and the larger processes of social transformation."To prepare an effective and quality teacher is the responsibility of Teacher educator. To bring desired quality in student teachers, a teacher educator should practice and orient them towards it. Thus, it is essential for Teacher Educator

to practice and orient student teachers for the wholistic approach, so that, they can use this approach in classroom for the development of whole.

Bhatia (2009) reported that the Wholistic approach was found to be effective for science teaching and helpful to understand the wholistic nature of science. The researcher felt that the same study should be extended to the school level. The research is intended to teach the student teachers through wholistic approach in such a way that it facilitated their wholistic development. The researcher envisaged developing Wholistic Approach to Teaching Science (WATS) cutting across cognitive, affective, psychomotor, spiritual, health and environment domains to develop teacher as a promising member of larger society facilitating wholistic development.

1.16. Specification of the Problem

1.16.1. Statement of the Problem

Effectiveness of Educating Student Teachers on Wholistic Approach to Science Teaching

1.16.2. Objectives of the Study

1. To design a programme for orienting student teachers on Wholistic Approach to Science Teaching.
2. To study the efficacy of Wholistic Approach to Science Teaching in terms of wholistic development of student teachers.
3. To study the reactions of student teachers towards Wholistic Approach to Science Teaching.

1.16.3. Hypotheses of the Study

1. There will be no significant difference among the two subsequent pre-test mean scores of student teacher on Knowledge and Skill Check up.
2. There will be no significant difference among the two subsequent post-test mean scores of student teacher on Knowledge and Skill Check up.
3. There will be no significant difference between the pre-test mean score and post-test mean score of student teachers on Knowledge and Skills Check up.

4. There will be no significant difference between observed frequencies and expected frequencies of student teachers against equal probability on various statements of the Reaction Scale.

1.16.4. Operational Definition of the Terms

1. **Efficacy:** Efficacy was studied in terms of significance of difference between the pre-test mean scores and post-test mean scores on Knowledge and Skills Check up of student teachers, wholistic development of student teachers and reaction of student teachers.
2. **Cognitive Development:** Cognitive (knowledge, comprehension, application, analysis, synthesis and evaluation) development was studied in terms of significance of difference between mean achievement scores on pre-test and post-test.
3. **Affective Development:** Affective (receiving, responding, valuing, value organization and characterization by a value complex) development was studied in terms of significance of difference between affective domain mean scores on pre-test and post-test.
4. **Psychomotor Development:** Psychomotor (impulsion, imitation, manipulation, precision, articulation, and naturalization) development was studied in terms of significance of difference between psychomotor domain mean scores on pre-test and post-test.
5. **Health & Environment Development:** The Health & Environment Development is constituted of Health Awareness, Healthy Relation between Self & Nature, Contribution to Healthy Self, Contribution to Healthy Environment, and Realizing Health Entrainment Ratio as contained in the observation schedule. The development of Health & Environment was measured through the items in the observation schedule on five point scale.
6. **Spiritual Development:** The Spiritual Development is constituted of Wholistic Perception, Immersion, Interrelation, Emerging Action, and Universal Becoming as contained in the observation schedule. The Spiritual Development was measured through the items in the observation schedule on five point scale.

1.16.5. Explanation of the Term

Wholistic Approach: Wholistic approach in the context of present study attempts to realize cognitive, affective, psychomotor, health and environment and spiritual development.

1.16.6. Delimitations of the Study

The study has been delimited to the student teachers, who had opted for Science Method in B.Ed. Programme of Gujarat. Further the study was delimited to the selected English medium B.Ed. colleges of Gujarat.