

**DEVELOPING AND IMPLEMENTING LIFE SKILL BASED
ACTIVITIES IN SCIENCE AND TECHNOLOGY SUBJECT IN
CBSE SCHOOLS OF VADODARA CITY**

A

Synopsis

Submitted in partial Fulfilment of
the Requirement for the Degree of
Doctor of Philosophy
in Education

Guide

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1. INTRODUCTION

Education is the course of development and learning that takes place in formal and informal setting such as school, home, society where accumulated knowledge and values of humanity and civilization is transferred to the next generation. Now days, the goal of education have changed as compared to earlier where students were trained to store and retrieve mastered information. Under such circumstances, development of the students at secondary level, through education alone may not be sufficient for survival in this challenging world. There is a dire need of reorientation of traditional education system with the integration of new skills and strategies, so that the demands of the students will be satisfied. Various studies suggest that training of life skills has been found to be very effective in reducing substance abuse such as cigarette smoking (Botvin et.al, 1980), drug abuse and alcohol (Botvin et.al, 1995, 2012), tobacco prevention (Zollinger et.al, 2003 and Botvin et.al, 2003), enhancing self-confidence, self-esteem, reproductive health, gender issues (Khera & Khosla, 2012), developing behaviour (Nair, 2005) and play an important role in moulding students. It means developing Life Skills among students, helps them to deal with many issues such as gender-based violence, discrimination, school drop-out, poverty, unstable housing, survival sex, the need for gender affirmation, and challenges accessing culturally competent healthcare.

2. CONCEPT OF LIFE SKILLS AND LIFE SKILL EDUCATION

The concept of Life skill and Life Skill Education is adaptable and includes wide range of skills which can be implemented according to the needs and demands of the society. Since past three decades, the concept emerged as an important viewpoint among national and international educational bodies for the emotional, social and educational development of young generations.

2.1 Life Skills

The World Health Organization (1997) has defined life skills as, "the abilities for adaptive and positive behaviour that enable individuals to deal effectively with the demands and challenges of everyday life". 'Adaptive' means that a person is flexible in approach and is able to adjust in different circumstances. 'Positive behaviour' implies that a person is forward looking and even in difficult situations, can find a ray of hope and opportunities to find solutions. The life

skill approach combines knowledge, attitudes and skills into actual abilities – i.e. “What to do and how to do it”. Rychaen and Salganik (2001) defined life skills on three general criteria, namely a) key competencies contribute to an overall successful life and a well-functioning society, b) instrumental at meeting important challenges in a wide spectrum of relevant contexts, and c) are relevant to all individuals. These key competencies includes: a) functioning in socially heterogeneous groups, b) acting autonomously and c) using tools interactively. In other words, with the help of life skills, one is able to explore alternatives, understand and weigh pros and cons and make rational decisions in solving each problem or issue as it arises.

2.2 Life Skill Education

The Mental Health Promotion and Policy (MHP) team in World Health Organization’s (WHO **1999**) Department of Mental Health has given this definition of life skill Education: “Life skills education is designed to facilitate the practice and reinforcement of psychosocial skills in a culturally and developmentally appropriate way; it contributes to the promotion of personal and social development, the prevention of health and social problems, and the protection of human rights”. According to Srikala and Kishore (2005), life skills education can be seen as empowering adolescent to take more responsibility for their actions. Education of life skills enables the individual to flourish their knowledge, values and views, meaning that the individual knows when and how to do a task. Life skill education motivates healthy behaviours and increase self-confidence. Taremian & Mahjuie (1999) proposed that educating the life skills is one of the factors leading to the development of psychological health and the achievement of such skills would lead to individual, social, cultural and political evolutions. Life Skills Based Education (LSBE) is an approach used to address specific content to achieve a certain goal (UNICEF, 2003). Life Skill Education aims development of positive behaviour and growth of the self-empowerment.

3. KEY LIFE SKILLS

A number of Life Skills has been approved and accepted by different organisations working in the field of educational development. Ten Core Life Skills suggested by CBSE, which are also included in the life skills list given by World Health Organization (WHO), United Nations International Children's Emergency Fund (UNICEF) and United Nations Fund for Population Activities (UNFPA) are considered for the present study by the researcher. These were:

- Critical thinking
- Creative thinking
- Decision making

- Problem Solving
- Effective communication
- Interpersonal relationship
- Empathy
- Self-awareness
- Coping with stress
- Coping with emotion

In Chapter IV of Teacher's Manual on Continuous and Comprehensive Evaluation, classes IX-X by CBSE (2009), these ten core life skills are divided under three major headings: Thinking Skills, Social Skills, Emotional Skills. Critical thinking, creative thinking, decision making, problem solving are explained under the heading Thinking Skills; effective communication, interpersonal relationship and empathy under Social Skills; self-awareness, coping with stress, coping with emotion are described beneath Emotional Skills. CBSE emphasised on the importance of Life Skills in its Teacher's Manual on Life Skills classes IX-X (2010). According to CBSE Teacher's Manual on Life Skills classes IX-X (2010), "with the enhancement of thinking skills, an individual demonstrates the ability to be original, flexible and imaginative. Instead of taking all that comes in his/her way, he/she raises questions and thinks critically, identifies and analyses problems. Social skills help a person to demonstrate the ability to identify, verbalize and respond effectively to others' emotions in an empathetic manner. With enhanced emotional skills an individual is able to identify causes and effects of stress on oneself and develop and use multi-faceted strategies to deal with it". Development of life skills among students is the necessity of the hour as life skills educate and brief them for the better and sustainable future.

4. OBJECTIVES OF LIFE SKILL EDUCATION

The goal of life skill education is development of "self-efficacy" in students. UNESCO, WHO, different NGO working in the field of Life Skill Education and various educational bodies at national and international level, proposes different objectives of Life Skill Education according to their understanding. According to the life skill manual of CBSE (2010), the core objective of introducing the Life Skills Education is to empower the affective domain of the learners so that they are able to develop a sense of self-confidence, eco-sensitivity and right approaches to life processes etc.

Some objectives of Life-Skill education as given by CBSE Teacher's Manual on Life Skills classes IX-X (2010) are given below:

- It should not only address knowledge and attitude change but more importantly, behaviour change.
- Traditional "information-based" approaches are generally not sufficient to yield changes in attitudes and behaviours. For example, a lecture on "safe behaviour" will not necessarily lead to the practice of safe behaviour. Therefore, the lecture should be substantiated with exercises and situations where participants can practice safe behaviour and experience its effects. Most learning theories emphasize that learners learn best that which they can associate with their experience and practice.
- It will work best when augmented or reinforced. If a message is given once, the brain remembers only 10 percent of it one day later and when the same message is given six times a day, the brain remembers 90 percent of it. Hence, they need to repeat, recap, reinforce and review.
- It will work best if combined with policy development, access to appropriate health services, community development and media.
- To develop skills to empower young adolescents to respond to real life situations in positive and responsible ways.

- To increase awareness among youth about the social concerns and to alleviate social evils.

CBSE has introduced life skill education as an integral part of the curriculum of class VI from the academic year 2003-04 and in class VII in 2004-05. Initially, CBSE has introduced life skill education as an individual subject through co-curricular activities or other informal modes of learning but later it has been introduced in the formal modes of learning through various textbooks such as Language Textbooks, Science- Textbooks and Social-Science Textbooks in the form of activities and chapter reviews.

5. INTEGRATION OF LIFE SKILL EDUCATION AND SCIENCE AND TECHNOLOGY SUBJECT

Since science is about asking questions and finding answers to questions, these are actually the same skills that we all use in our daily lives as we try to figure out everyday questions. The benchmarks for Science Literacy, American Association for the Advancement of Science (AAAS, 1993) suggests that "By the end of the 12th grade, students should know why curiosity, honesty, openness and scepticism are so highly regarded in science and how they are incorporated into the way of science is carried out; exhibit those traits in their own lives and

value them in others”. According to AAAS (1993), taken together, these values, attitudes and skills can be thought of as habits of mind because they all relate directly to a persons’ outlook on knowledge and learning and ways of thinking and acting. Introducing Life Skills Education in teaching of Science brings a new perspective to educating our young generation in a fun, exciting and engaging manner. Life Skills Education brings brilliant idea of integrating the teaching of Science with elements of emotional and social education, by exploring themes like creativity, teamwork, flexibility. The pedagogy for transacting life skill education through science and technology subject has to be interactive and experimental in nature so as to help in developing life skills along with scientific skills. Life Skill approach emphasizes “Learning by Doing” which is also important in science and technology subject. Thus both integrated together may yield much more effective results.

6. SCIENCE AND TECHNOLOGY AT SECONDARY LEVEL

At secondary level, science as a subject involves teaching and learning of basics of scientific concepts in the form of physics, chemistry and biology which help to instruct the importance of nature of science among secondary students. To develop motivation and curiosity for science among schools students, it is important to inculcate and strengthen the commitment to inquiry, curiosity, objectivity, scientific outlook, open mindedness at this level of schooling, According to National Council of Educational Research and Training (NCERT 2006), the objectives of teaching of science at secondary level are as follows:

- Know the facts and principles of science and its application, consistent with the stage of cognitive development.
- Acquire the skills and understand the methods and processes that lead to generation and validation of scientific knowledge.
- Relate to the natural environment, local as well as global, and appreciate the issues at the interface of science, technology and society.
- Acquire the requisite theoretical knowledge and practical technological skills to enter the world of work.
- Nurture the natural curiosity, aesthetic sense and creativity in science and technology.
- Imbibe the values of honesty, integrity, cooperation, concern for life and preservation of environment. Cultivate scientific temper, objectivity, critical thinking and freedom from fear and prejudice.

Teaching learning of science education and its importance is not just limited to few objectives. New and innovative methodologies which includes local context with local and foreign

curricula are the need of the hour for effective development of scientific skills and scientific concepts among students of the secondary level. According to Piaget's theory of cognitive development, children's intellectual development is not a quantitative process rather intellectual development takes place qualitatively in children. It means, at secondary level it is important to understand the needs of the students and deliver them accordingly so that their rational and logical thinking develops qualitatively in a much more effective way.

7. REVIEW OF RELATED LITERATURE

For deeper understanding and conception into research carried out by the researcher, seventy studies from India and abroad were reviewed by the researcher. Since, the present study is interrelated with science and technology subject and the development of life skills in the secondary students, the researcher reviewed the literature related to life skills and skill development through formal education. The researcher tried to focus on the studies related to Life Skills, Life Skill Education and science and technology subject.

Out of the seventy six studies reviewed, ten are mentioned below. These ten studies includes studies related to developing life skills through different modes.

Anderson and Moore (2009) investigated the impact of Life Skills training programme on school aged children and adolescents. The main goals of the programme was to teach prevention-related information, promote anti-drug norms, teach drug-refusal skills, and foster the development of personal self-management skills and general social skills. The research design was quasi experimental and exploratory in nature. Results indicated that the Life Skills training programme was effective in developing self-management skills.

Botvin, Griffin, Paul & Macaulay (2003) conducted a study in preventing tobacco and alcohol use among elementary school students through Life Skills Training. The present study examined the effectiveness of a substance abuse prevention programme in preventing tobacco and alcohol use among elementary school students in grades three through six. The prevention programme was aimed to teach social resistance skills and general personal and social competence skills. Rates of substance use, behaviour, attitudes, knowledge, normative expectations, and related variables were examined among students (N = 1090) from 20 schools who were randomly assigned to either received the prevention programme (9 schools, n = 426) or served as a control group (11 schools, n = 664) who did not. Data were analysed at both the individual-level and school-level. Individual-level analyses controlling for gender, race, and family structure showed that post/due to intervention students reported less smoking in the past year, higher anti-drinking attitudes, increased substance use knowledge and skills-related knowledge, lower normative expectations for smoking and alcohol use, and higher self-esteem

at the post-test assessment, relative to control students. School-level analyses showed that annual prevalence rate was 61% lower for smoking and 25% lower for alcohol use at the post-test assessment in schools that received the prevention programme when compared with control schools. In addition, mean self-esteem scores were higher in intervention schools at the post-test assessment relative to control schools. Findings indicate that a school-based substance abuse prevention approach previously found to be effective among middle school students is also effective for elementary school students.

Buhs (2000) in a study entitled programme evaluation of the American Indian Life Skills development curriculum with American Indian and Caucasian adolescents found that after Life Skills Training Course, there was change in their self-esteem and depression. The pre-test/post-test of self-esteem and depressive symptomatology were administered and a three-month follow up of students was done. Qualitative analysis indicated that the students learned about the areas covered in the training programme, their self-esteem scores increased and depression decreased between pre and post-test and again between the post-test and follow up the depression again increased. Students did not learn significantly more about problem-solving, including what to do if in a situation with suicidal individual. According to statistical analysis, insight ratings indicated that students did not gain the insight regarding their emotions, self-esteem, problem solving and self-destructive behaviour up to the limit that was required.

Gafoor and Shemi (2007) found Impact of study skills training on achievement in biology of standard eighth students. The results of the study showed positive results in favour of using study skills in the subject of biology. The major objective of the study was to test the effect of study skills training on the achievement in biology of standard eighth students. The sample was 128 students from standard eighth. 64 students formed experimental group and the same number formed control group. There was a marked effect on Achievement in Biology in study skills trained group as a result of study skills training in the total sample. The same result was obtained from the analysis of sub samples based on gender and levels of achievement. The percentage of mean post test scores of study skills trained group and control group in total sample and subsample, 10-18 percent of increase in the achievement in Biology of standard eighth students was observed. Students and teachers highly appreciated the effectiveness of study skills training in improving the learning skills. It was very useful in enhancing achievement as its effect is highest in low achievement strata, though high achievers and average achievers also are supported by it in improving their learning skills. The findings suggested that study skills were positively related to academic achievement. The development of study skills will remain important in advancing student's academic, personal and

professional success. By providing proper assistance and guidance, low achievers and average achievers can improve their academic performance. In the teaching process, if teachers took responsibility of equipping students with important study skills, students would become independent learners to a great extent. At least a few hours in every term should be set apart to develop newer techniques and skills which will make the learners better in learning and achieving.

Grover (2006) investigated a study entitled impact of teacher monitored on-line instructional programme on various Life Skills and academic stress of secondary school students. The main objective of the study was to study the impact of teacher monitored on-line instruction; on-line instruction without teacher monitoring and conventional instructional method on Life Skills and academic stress. The sample was 133 students of class ninth from co-educational English medium schools. The study was investigated with the help of pre-post experimental design. The control group was taught through conventional method and experimental group was given treatment. After the experiment, results showed that students taught through on-line instructional package scored higher in various Life Skills i.e. skill of problem solving, creative thinking, social skills, acquiring knowledge, communication and decision making, than the students who taught through conventional group learning. It further showed that Students studying through on-line instruction with teaching monitoring, on-line instruction without teacher monitoring and conventional group learning scored almost equal gain scores on academic stress. The students of three groups perceived equal academic stress. The results of the present investigation indicated that on-line instructional technology may be used to enhance the performance of the students in the Science subject at the secondary level as compared to the traditional method of teaching. Further it was suggested that while teaching students through on-line teacher monitored instructions, control, self-pacing and flexibility were the major advantages offered to the learners which lead to propose that such a strategy was more effective than traditional models.

Kalanda (2010) investigated a study entitled Life Skills and reproductive higher changes behaviour in students and teachers. To address early drop out of school, drug abuse and contracting sexually transmitted diseases including HIV, the Malawi Government introduced Life Skills and Sexual and Reproductive Health (LS/SRH) education. The objective of LS/SRH was to empower pupils and their teachers with Life Skills for HIV prevention, sex and sexuality issues. This study evaluated the current levels of knowledge of LS/SRH in primary school pupils and secondary school students after the introduction of LS/SRH. It also investigated reported behaviour changes in pupils, students and teachers due to LS/SRH. Implementation

challenges of LS/SRH were also investigated. Knowledge of LS/SRH was low amongst primary school pupils and slightly higher amongst secondary school students. LS/SRH has also led to behaviour changes amongst pupils, students and teachers. Lack of teaching materials, poor orientation of teachers on LS/SRH, and teaching time are the major challenges affecting the teaching of LS/SRH. In the light of high HIV prevalence among young people in Malawi, the government should continue to support LS/SRH in primary and secondary schools. LS/SRH should be made examinable to encourage both students and teachers to take it seriously. More resources should be provided to create an enabling environment for teaching LS/SRH.

Paul, et al. (1990) investigated children's performance of practical Life Skills and stated that the acquisition of practical life-skills is a domain of child competence that has received little research attention. Information on children's knowledge and performance of 20 life-skills was obtained from children aged either 8-9 years or 15-16 years and from one parent. Parents and children generally agreed on children's abilities at significant levels. Among younger children, life-skills competence was significantly associated with a measure of parental attention, parental loss, and maternal employment. Among adolescents, life-skills competence was significantly associated with maternal employment, family size, the frequency of family activities, and parental education. Life-skills competence was generally not associated with measures of academic competence.

Pereira and Krishnan (2011) analyzed the Life Skills of secondary school students in Kerala. Normative survey was used for collecting data and sample consists of 230. Eighth and ninth standard students of eight CBSE schools who were selected through random sampling technique. Tool used was Life Skills attribute schedule covering four areas decision making skill, problem-solving skill, critical thinking skill and stress management skill. The results revealed that above average level of Life Skills was present among the CBSE secondary school students, there was no gender related difference found in the Life Skills of students. The students from rural area were having more Life Skills than those from urban area.

Shechtman, Levy and Leichtentritt (2002), evaluated outcomes and implementation processes of teacher training in the Life Skills training programme in Israel. It was an education programme that focused on Life Skills in four major areas: (1) identity development or purpose in life; (2) problem solving or decision making; (3) interpersonal relationships; and (4) physical health maintenance. Participants included three groups of teachers (N = 214): (1) teachers who did not receive training; (2) teachers in their first year of training; and (3) teachers in their second year of training. Results indicated that teachers with two years of training had significantly higher scores on work environment and self-efficacy measures than the scores of

teachers with less training. The discussion highlights the need for educators to allow enough time for training teachers in the programme.

Thurston (2002) examined the results of a life-skills management programme, survival skills for youth, organized and delivered to rural youth via collaborative efforts of education and non-education agencies. The programme was replicated with ten groups of rural youth in Tennessee and Missouri (N=114). All programmes were a collaborative effort of two or more organizations, such as University Extension, school districts, juvenile justice programmes, and state human service or workforce development programmes. Pre and post evaluations of knowledge of life management concepts, self-esteem, and social skills showed that Life Skills programme was effective in changing the attitudes and behaviours' of rural youth.

After a thorough review of literature (which includes studies as well as articles across the world) related to the current study, research tried to figure out few findings and important points in the form of implications. These implications are revealed below which includes conclusions and verdicts from different researchers and academicians working in the field of life skill education.

8. IMPLICATIONS OF REVIEW OF RELATED LITERATURE

At elementary schools, Life Skills programme promoted positive social adjustment, improved academic performance (Elias, et al., 1991) and prevented tobacco and alcohol use (Botvin, Griffin, Paul & Macaulay, 2003). For adolescents Life Skills based intervention improved impulsive control (Caplan, et. al., 1992), developed self-management skills (Anderson and Moore, 2009), prevented peer rejection, reduced bullying (Mize & Ladd, 1990), improved teacher-student relationship (Thurston, 2002), reduction in drug use (Botvin & Griffin, 2012), increased self-esteem and decreased depression (Buhs, 2000) and improved AIDS related knowledge topics and positive perception of condom use and had more realistic perceptions regarding susceptibility and seriousness about HIV / AIDS (Meyer and Steyn, 1992).

Life Skills training was reported as effective in enhancing mental health, self-esteem and assertiveness among students (Nejad, 2010). Influence of Life Skills modelling through literary connections on student academic success in English class was studied, and deep critical connection were found to be apparent (Laleman, 2010) and problem-solving Life Skill was found to be relevant to science and technology for secondary school students (Vashista & Bhardwaj, 2006). Learning mathematics was noted to develop the Life Skill like problem solving among middle class students (Kumari, 2002), for development of Life Skills, afterschool programme that utilized experiential and co-operative learning activities (Junge, et

al., 2006) and classroom-based social decision-making intervention for middle school years (Elias & Kress, 2005) was suggested.

For physically challenged students, sports and Life Skills intervention was stated to increase coping skills, athletic perceived performance and general self-worth (Moffett, 2005). Motor coordination problems were reported to reduce ability in daily Life Skills among school girls with autism spectrum disorder and developmental coordination disorder (Kopp & Gillberg, 2010), students with dyslexia reported positive views of their own Life Skills development self-efficacy in academic, personal, social and career and talent development domains (Shea, 2011) and instructors of rural high school students with mental retardation reported effectiveness of personal-social skills curriculum when continued for an extended period of time and with continuous reinforcement (Quigley, 2007).

Employee productivity was reported to be enhanced by Life Skills training that facilitated psychosocial skills (Maree & Ebersohn, 2000) and increased efficiency and quality of work (Lobner, 1997) and reduce problems at workplace (Hartley, 2007). Life Skills training programme was related to higher self-efficacy (Shechtman, Levy & Leichtentritt, 2002)

The activity oriented instruction was found to be effective in Life Skills education than conventional lecture method for secondary school students (Pereira & Krishnan, 2011), use of music in teaching Life Skills to students with emotional disabilities recommended (Emeka, 2009), on-line teacher monitored instructions for Life Skills was suggested to enhance performance of students at secondary level (Grover, 2006), systematic and formal teaching of Life Skills to middle and junior high school students was recommended for interpersonal relations and survival and succeed (Hamburg, 1990), enterprise mode of learning was suggested for flexible market economy (Jones, Brian, Airedale & Norma, 2006), provision of resources for teaching Life Skills and sexual and reproductive health was recommended (Kalanda, 2010).

Open and distance learning mode was suggested to deliver programme on Life Skills to adolescents (Lineo & Kolosoa, 2009), quality instruction model with home based remediation was reported to enhance performance of students on Life Skills (Malhotra, 2006), Barnlund transactional model of communication was found to be effective in enhancing Life Skills of students like critical thinking, decision making and communication skills (Meena, 2006), Making Familiar Strange approach of Synectic model of teaching was reported to enhance creative thinking ability of learners (Pany, 2008), child play-based programme was developed to nurture children's creative expression (Rowland, 2002), project based learning was reported as successful to teach important Life Skills to help students succeed in college and life in

general (Scott & Jenifer, 2009; Zimmer, 2008) and films on content of critical thinking skills were reported to improve knowledge of the content area (Weerts & Sally, 2005).

Life Skills training was indicated to decrease onset of smoking behaviour among students of eighth, ninth and tenth grades due to increased ability to cope with direct pressure to smoke, anxiety and decreased susceptibility to indirect pro-smoking social influences (Botvin & William, 1980) and decreased drug and alcohol use among ninth grade students (Carmack, 2005) and student of the programme indicated intention to stay smoke-free (Zollinger, Commings & Caine, 2003). Life Skills based education was stated to reduced probability of young individuals to engage in interpersonal violence (Guera, 1994), Life Skills based structured learning therapy reduced depression among students (Reed, 1994) and reduced peer directed aggression among boys (Hudley & Graham, 1993), positively impacted decision making, problem solving and conflict management (Magee, 1999).

Life Skills training programme for college students was found improve self-concept, reduce depression and anxiety (Davis, 2004), self-perception of personal Life Skills was not significantly different (Nava, 1998) and significantly different (Waltemire, 1999) among traditional and non-traditional college students and for youth of high school, developed coping skills for anxiety and depression, interpersonal and cooperative skills (Shangold, 2004) and contextual variability in transfer of problem-solving skills was suggested to increase likelihood of accurately solving transfer problems and recognize principles in novel problems (West, 2003). Inclusion of study of Life Skills on teacher education programme was suggested in facilitating learning, manage class, generate resource and assess (Louis, 2008), Parental responsiveness was indicated to predict Life Skills development in older adolescents (Slicker, et al., 2007).

Social skills training programme was found to be effective on behaviour problems of child (Misner, 1995), to develop interpersonal behaviours and skills for adolescents (Chaudhari, Vaidya and Mahapatra, 2007). Awareness training model of life science was noted to be effective to develop creativity and academic achievement (Christane, 2008). Study skills training to standard eight students was found to have positive impact on their achievement in biology (Gafoor and Shemi, 2007). Guidelines to develop skills for adolescents to encourage positive choices was designed by Halter and Lang (1994)

9. RATIONALE OF THE STUDY

The researcher has visited nearly ten CBSE schools of Vadodara city. In CBSE schools, life skills are taught as a separate subject. The Researcher observed that schools are not integrating life skills with subjects, even they are not teaching the subjects through life skills or life skill-

based activities and teachers are not employing different methods or life skill activities to teach. Students understand the content but they do not understand the importance of that particular content, they do not understand the role of scientific inquiry in increasing understanding of the world around them. It is important to develop the importance of science in student's lives, the role of scientific inquiry in increasing understanding of the world around them and confidence in making reasoned and evidence-based decisions about the current and future and influence of science and technology, including ethical considerations. Student's situation analysis power and problem-solving abilities should be enhanced through life skill-based activities which are included in life skill education.

The Mission of Life Skills Education according to CBSE (2013) is to develop the accurate, objective and scientific knowledge, attitudes and value enhanced life skills equipped learners, that is the students, through a behaviour development approach with adequate delivery of content to address knowledge, attitudes and value enhanced life skills. At schools this can be achieved through integration of life skill-based activities with regular curriculum, where the practice of life skills by teachers is crucial for students to model and by connecting the life skills to the day to day events to make its practice easier for them. Owing to such an enriched curriculum, the teacher helps the student to identify their strength and help them to develop their skill by acknowledgment and encouraging their positive behaviours. Different methods can be adopted for teaching life skills like activity based, and sharing examples for making them understand the importance and application of their routine, like the role of scientific inquiry in increasing understanding of the world around them and so on. The study on life skills from the perspectives of classroom and teachers expressed that science courses as a significant setting to teach life skills and it was found that some in-class and extracurricular activities were used by the teachers to teach life skills (Kurtdele-Fidan, & Aydođdu, 2018).

The life skills like curiosity, problem solving and scientific temper can be developed along with learning science and also creative thinking that can be linked to art practice too. With technological advancements various challenges arise along with the benefits that can be effectively dealt through illustration of life skills through the school curriculum for students. The integration of life skill education in science and technology subject is far-reaching an important step for developing skills such as critical thinking, evaluation and judgement, information processing, inferencing and scientific inquiry in adolescents to help them understand more effectively the world and make decisions based on reason and evidence.

These life skills can be illustrated through every subject, like for interpersonal skills and effective communication, languages can be helpful to encourage reading writing and

interaction with other students. The early development years of adolescence, which is from age 10 to 14 years is critical in terms of building skills and positive habits, for the mental and social wellbeing in young children. At this age, the ability of critical thinking, recognition of self, and problem solving where development of skills and competencies is crucial for formation of sense of identity among students. The vital role is played by life skills education to create awareness and provide guidance and direction to the students by empowering them with decision making skills, promote mental wellbeing and competencies to equip them to deal with realities of life (CBSE, 2013). The core idea behind the integration of life skill education in science subject is to teach students how to think, evaluate and judge, process information and come to rules and conclusions.

10. STATEMENT OF THE PROBLEM

Developing and Implementing Life Skill Based Activities in Science and Technology Subject in CBSE Schools of Vadodara city

11. OBJECTIVES OF THE STUDY

Following are the objectives of the study:

1. To develop Life Skill based Activities in Science and Technology subject for class IX.
2. To implement Life Skill based Activities for class IX in Science and Technology Subject.
3. To study the effectiveness of life skill based activities in terms of achievement in post-test of experimental group.
4. To study the opinion of students with regard to implemented Life Skill based activities in Science and Technology at class IX.

12. HYPOTHESIS

There will be no significant difference in the post-test mean achievement score in Science and Technology subject of class 9 students of Experimental and Control group.

13. DEFINITION OF THE TERMS USED

Life Skills based Activities: Includes various activities prepared on the concepts such as tissue, types of tissue, force, cell organelles, water; in the subject of science and technology at class IX. The activities were comprised of role play, quiz, hands-on projects, discussions, surveys, debates etc looking into the scope of thinking, emotional and social skills. These activities were distributed under three categories – Social Skills, Emotional Skills and Thinking Skills.

14. OPERATIONAL DEFINATIONS

Effectiveness: Effectiveness was studied in terms of significance of difference between the post-test mean scores of experimental group and control group with respect to the given treatment through developed life skill-based activities.

15. DELIMITATION OF THE PROPOSED STUDY

- The study was delimited to class 9th CBSE Schools of Vadodara City.
- The Study also delimited to ten core life skills namely self-awareness, empathy, critical thinking, creative thinking, decision making, problem solving, effective communication, interpersonal relationship, coping with stress, coping with emotions; as given in the CBSE manual of life skills for IX standard.

16. RESEARCH DESIGN

The proposed study is experimental in nature. The pre-test and post-test controlled non-equivalent group design was followed in this research. The design of the study is presented as follows:

O1 X O2

O3 C O4

Where, O1 and O3 are pre-test, O2 and O4 are post-test, X stands for Experimental Group and C stands for Control Group.

Researcher took one control and one experimental group as intact classes. This design is one of the most effective in minimizing the threats to experimental validity and extraneous variables. Most of the threats like history and maturation were controlled by taking control group. Effect of testing was minimized by taking post-test parallel to the pre-test. The tools were validated by experts so the threat to unstable instrument was taken care of.

17. POPULATION

The population for the study was comprised of all the Class IX secondary school students of CBSE English medium secondary schools in Vadodara city during the year 2015-16. The numbers of CBSE affiliated schools in Vadodara city were 22, till 2015.

18. SAMPLE

The sample of the study was selected purposively. Two secondary schools, both affiliated to CBSE in Vadodara city, were selected purposively. The selected schools have all the infrastructural facilities (smartboards linked with computers and well equipped science labs), important for the implementation of the programme and also the school readily consented to provide those facilities to the researcher for the effective implementation of the programme. 40 Students of class IX of one school were selected for experimental group and 40 students of

class IX of other school were considered as control group. Students of experimental group were taught in the academic year 2015-16 for one semester by the researcher, integrating science and technology subject through life skill based activities while control group was taught by their teacher in a traditional method.

19. TOOLS USED FOR DATA COLLECTION

1. Pre and post achievement test: The test was constructed by the investigator. It was validated by experts. To achieve the objectives of present study, test which comprised of multiple short answer questions was prepared and validated by the subject experts of the given chapters. Achievement test was based on subject as well as life skill based activities and administered on experimental as well as control group. The test covered all types of questions related to life skills and content knowledge based on the topics from the science and technology subject which were covered under the study (such as cell, tissue, force, cell organelles). The test has eleven question and one comprehension which has three sub questions. Most of the questions have two or more sub questions and carry different marks. Distribution of marks to each question was based on difficulty level of that question. The test was outlined in such a way that it would be able to test subject content knowledge as well as life skills. The test was subjective (short answer type) in nature and includes question which could be answered by using different life skills along with subjective knowledge.
2. Development of worksheets for various life skill-based activities: Worksheets for various activities were prepared by the researcher. These worksheets were assessed using checklist given by CBSE in Chapter IV of Teacher's Manual on Continuous and Comprehensive Evaluation, classes IX-X for assessing Life Skills.
 - a. Checklists: Life skill-based activities were assessed by using appropriate checklists. These checklists are based on the sub-skills of Thinking skills, Emotional skills and Social skills such as students' creativity, motivation, concept clearing abilities, problem solving, patience, appreciating others, comfortable in every situation, healthy completion, argumentative, shows respect, stress management, anger control, imaginative, responsible, flexible, analyze problems, active listener, question raisers, empathetic, co-operative, creative, coping with stress etc. These checklists are further graded on the basis of five-point grading scale as given in life skill manual of CBSE.

The grading scale includes: A*, A, B, C and D.

Grading Scale: The five-point grading scale is given below

Most indicators in a skill	A*
Many indicators in a skill	A
Some indicators in a skill	B
Few indicators in a skill	C
Very few indicators in a skill	D

These grades were given by using descriptive indicators used in the checklist of all the life skills reflected by the students in the worksheets and during the class.

3. Opinionnaire: In order to get the opinion of the students towards the life skill-based activities in science and technology subject, opinionnaire was prepared. The opinionnaire includes open ended questions seeking students suggestions and their opinion towards the developed programme.
4. Perception Scale: 5 point Perception Scale was prepared by the investigator to know the perception of students about the activities conducted during the programme.

20. DIFFERENT PHASES OF THE RESEARCH DESIGN

Research design for the present study includes different stages such as developing the programme and data collection tools, implementing the programme as well as collecting required data for the study.

Detailed explanation of the research design for the present study is presented under the following phases:

Phase I Development of the programme

The programme which includes activities based on life skill education in science was developed on basis of requirements and level of the students. The programme is specially designed to impart a particular life skill and involves techniques such as group participation and group discussion, brainstorming, role play etc. Before developing programme, NCERT book of Science and Technology for IX standard was thoroughly analyzed by the researcher and discussed with the guide as well as science teachers of IX standard to find most appropriate topics for the study. After detailed scrutiny, fifteen topics from the first term course syllabus were selected by the researcher for developing programme. The selected topics were cell, cell organelle, tissue, animal tissue mixture, separation of mixture, types of tissues, water, evaporation, life history of Newton, conservation of energy, states of matter, crop production, crop variety.

After determining and evaluating selected topics, activities were developed on the selected topics by the researcher. The developed activities were grounded on content (selected topic) knowledge and helped in the development of life skills among students.

Table1: Table showing activities and Life skills developed during these activities:

S. No.	Activities	Life skills
1	Activity 1	Thinking Skills: Creative thinking, critical thinking and decision making. Social Skills: Communication Skill, Interpersonal relationship. Emotional Skill: Coping with stress.
2	Activity 2	Thinking Skills: Creative thinking, critical thinking and decision making. Social Skills: Communication Skill. Emotional Skill: Coping with stress, empathy.
3	Activity 3	Thinking Skills: Decision Making. Social Skills: Empathy, Interpersonal relationship. Emotional skills: Coping with stress, self-awareness.
	Activity 4	Thinking Skills: Decision Making, critical thinking. Social Skills: Communication skill Emotional skills: Coping with stress.
5	Activity 5	Thinking Skills: Decision Making, critical thinking, creative thinking, problem solving. Social Skills: Communication skill, empathy, interpersonal relationship. Emotional skills: Coping with stress.
6	Activity 6	Thinking Skills: Decision Making, critical thinking, creative thinking, problem solving. Social Skills: Communication skill, empathy, interpersonal relationship. Emotional skills: Coping with stress.
7	Activity 7	Thinking Skills: Critical thinking, creative thinking, problem solving. Social Skills: Communication skill. Emotional skills: Self-awareness.
8	Activity 8	Thinking Skills: Decision Making, critical thinking, creative thinking, problem solving. Social Skills: Empathy. Emotional skills: Coping with stress, coping with emotions and self-awareness.

9	Activity 9	Thinking Skills: Decision Making, critical thinking, creative thinking, problem solving. Social Skills: Communication skill, empathy, interpersonal relationship. Emotional skills: Coping with stress.
10	Activity 10	Thinking Skills: Decision Making, critical thinking, creative thinking, problem solving. Social Skills: Communication skill, empathy, interpersonal relationship. Emotional skills: Coping with stress.
11	Activity 11	Thinking Skills: Decision Making, critical thinking, creative thinking, problem solving. Social Skills: Empathy. Emotional skills: Coping with stress, coping with emotions and self-awareness.
12	Activity 12	Thinking Skills: Critical thinking, problem solving. Social Skills: Communication skill. Emotional skills: Self-awareness.
13	Activity 13	Thinking Skills: Decision Making. Social Skills: Empathy, Interpersonal relationship. Emotional skills: Coping with stress
14	Activity 14	Thinking Skills: Creative thinking, critical thinking and decision making. Social Skills: Communication Skill. Emotional Skill: Coping with stress, empathy, coping with emotions
15	Activity 15	Thinking Skills: Creative thinking, critical thinking and decision making. Social Skills: Communication Skill, Interpersonal relationship, empathy Emotional Skill: Coping with stress.

The activities developed on selected topics (mentioned above) of science subject were categorized as activity 1, activity 2 unto activity 15. Different activity was developed for different selected topic such as activity 1 was on the topic Tissue and activity 2 was on Types of tissue. Similarly, other activities were developed on all other selected topics and named as activity 3, activity 4 and so on.

Phase 2 Development of pre-post-test, perception scale, opinionnaire, worksheets and assessment tools: Post-test was same as pre-test. Five point perception scale was prepared and administrated on students to know their perception about the activities involved in the programme. Opinionnaire was prepared by the investigator to obtain the opinion of the students

of experimental group towards the life skill-based activities in science and technology subject. Assessment tools and worksheets were also developed for various life skill-based activities.

Table2: Techniques used by the investigator under different tools for data collection:

S. No.	Tools	Techniques Used
1	Pretest-posttest	Questionnaire – eleven open-ended questions with sub-questions and one comprehension having three following questions.
2	Worksheets	Worksheets were used after some of the activities to assess the effectiveness of the activities. These worksheets were assessed by using appropriate checklists. Scoring of these checklist were done by grading scale given by CBSE in Life Skill manual.
3	Perception Scale	5 point perception scale was used to know the perception of students about the activities.
4	Opinionnaire	Open-ended questions were used in the opinionnaire for preparing opinionnaire to know the opinion towards the developed programme

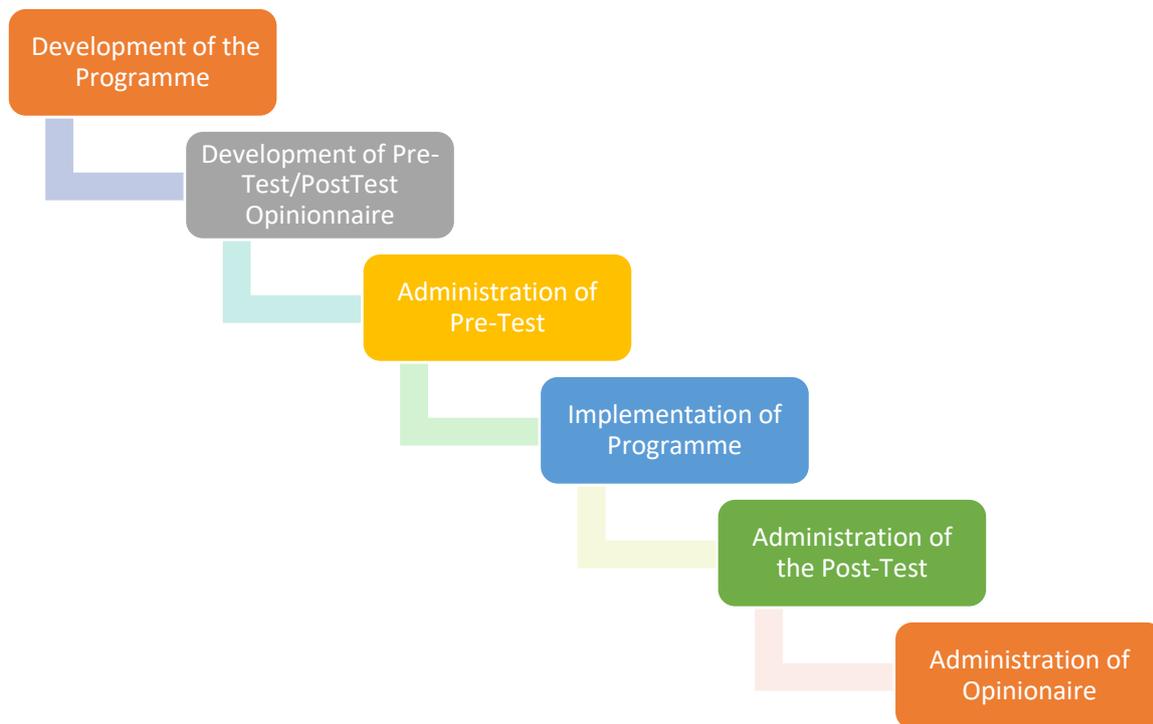


Figure – 1 – Phases involved in Research design of the study

Phase 3 Administration of the pre-test

Investigator implemented the pre-test in both, experimental and control groups. The pretest was implemented before the implementation of the developed programme in experimental group and at the same time in control group. The pretest was implemented in the month of March in 2015.

Phase 4 Implementation of programme

Developed programme which includes various activities, was implemented in the class room. Investigator took first semester course of science subject of 9th standard in the session of 2015-16, to administer the programme. In experimental group, programme was administered and control group was taken care by traditional method by their regular teachers. Investigator administered the developed programme in first half of the academic session in 2015 as the developed programme includes topics of first semester course of IX standard. As the researcher’s purpose was to study the development of life skills (if taught through science subject) only the selected topics (mentioned in Phase 1: Development of the programme), were

taught by the investigator through developed activities (developed programme) and remaining syllabus of the first term was taken care by class teacher.

Phase 5 Administration of the post-test

Investigator administered post-test on both control and experimental groups after the implementation of programme. At the end of the first semester course in the month of August, 2015, posttest was administered by the investigator on both control and experimental group.

Phase 6 Administration of the perception scale and opinionnaire

The perception scale and opinionnaire, both, were administered on the students of experimental group in order to get their opinion. Perception scale was administered in experimental group to know the perception of students of experimental group about the activities carried out during the programme. Opinionnaire was implemented to know the opinion of the students of experimental group about the developed programme.

21. DATA COLLECTION

The required data were collected with the help of pre and post achievement test in science, worksheets, perception scale and opinionnaire after implementation of life skill-based activities in science and technology subject to the experimental group. The data were collected at different points of time – before, during and after the conduct of developed programme. As the developed programme was implemented during the first semester of 2015-16 session of IX standard course, the pre-test was administered with the start of the session (March, 2015) and other data collection tools (worksheets) were administered during. After the programme, post-test as well as perception scale and opinionnaire was administered.

22. DATA ANALYSIS

- Since the collected data were quantitative as well as qualitative in nature, analysis of the collected data were done using different data analysis techniques. Non-parametric statistics was applied for quantitative data analysis. Wilcoxon Rank Test was applied to measure the influence of the intervention.
- Qualitative responses collected from the opinionnaire were analyzed through quantitative content analysis. Quantitative content analysis was done by coding the set of data provided in the opinionnaire and analyzing it through frequency count and percentage.

23. MAJOR FINDINGS

- Developed life skill based activities is found to be useful to the students in terms of achievement in science and technology subject.

- Developed life skill based activities is also found to be effective to the students in terms of achievement in the development of life skills among students.
- Life skill education integrated with science topics helped students to develop different skills important in life such as communication, coping with stress, managing emotions and interpersonal skills.
- The activities proved to be an effective remedy for the students to understand the concept of science by observing, analyzing and inferring the conclusion their self.
- The use of different activities helps students to understand as well as comprehend the concept in a more effective way and improve their life skills as well.
- Initially students were hesitant and feel shy to participate in the activities but afterwards, they found interest in the activities and enjoyed the activities.
- Students have favourable opinion towards developed Life skill based activities. According to them, the activities carried out during the programme were meaningful and helpful in developing the science concepts.
- Students felt, the teaching learning process adopted during the programme made concepts more easier to grasp.
- Students found activities interesting and useful for the effective understanding of science concepts.

24. DISCUSSION

The concepts of the science and technology subject chosen for the study were: tissues, types of tissues, Force, Balanced and Unbalanced force, Cell, cell Organelles, Water, Evaporation, Life History of Different Scientist such as Newton, States of Matter, Mixture. Developed Life Skill based activities includes those activities which were suitable for easy and effective explanation of the concepts chosen for the study. Most of the concepts chosen by the researcher are those, who did not have experimental base and have more explanatory part. For the success of Programme, researcher tried to organize all the activities and concepts in such a way that it is found to be effective and more comprehensive for the better understanding of the concepts as well as development of the life skills.

In the present study, at very initial stage students were hesitant and feel shy to participate in the activities but afterwards, they found interest in the activities and enjoyed the activities. Implemented activities were found to be more supportive in developing the concepts mastery of science and technology concepts. Along with the development of science concepts, life skills such as Self-Awareness, Interpersonal Relationship Skills, Communication Skills, Coping with

Stress, Coping with Emotions, Creative Thinking and Critical Thinking were also developed among students. Students felt more confident, emotionally more stable and also found more skilled for managing their stress level in any situation, after the implementation of the activities.

25. CONCLUSION

Life skill based activities integrated with science and technology subject can provide better understanding of the concepts and helpful in making the subject more interesting to the students and to the teachers as well. The integrated approach is helpful not only for the development of science concepts, rather it is also remarkable in developing life skills among students.

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