CHAPTER – V

Summary and Conclusions
### CHAPTER – V
**SUMMARY AND CONCLUSIONS**

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4. There exists a low positive correlation within all the 4 factors FNF, HHF, MF and EF in UEG. So all these 4 factors are independent in UEG.

CHAPTER -- V

SUMMARY AND CONCLUSIONS

5.0. Introduction

As per E. J. Holm Yard " A cloth merchant raises in the early morning from organic bed-sheets with cellulose, washes his face with organic paste, takes organic bread slice, and organic coffee for early breakfast, fills his car with organic compounds petrol, reaches his shop and sells organic clothes, taking lunch in the mid-day with organic material and comes back after closing the shop and takes organic dinner, reads organic news paper and books till his organic bed-sheets invite him once more". Chemistry plays a vital role in the daily life right from the early morning till reaching the bed; using the products related with the works of chemistry. A proper understanding of chemistry needs the ability to give reasons. A constant and continuous study and experimentation with patience, hard work, and devotion provides hidden values of chemistry curriculum.

Chemistry is a source of understanding is also a source of strength. Chemistry is never an end in itself. Chemistry is for the welfare of the entire
humanity of universe. Therefore, we must have knowledge of chemistry to use it intelligently.

Science teaching today is not so simple as it was in early fifties. But even in those days, audio-visual aids were used. Now in the existing school and class-room conditions science teaching become a challenge in developing the Scientific attitude and values hidden in Science. The knowledge of chemistry is essential for all disciplines.

Development of the values such as, utilitarian, disciplinary, cultural...of chemistry teaching is not enough for leading healthy, happy and peaceful life. Many more values namely Food and Nutritive values and Health and Hygienic values and the Medicinal values and Environmental values are to be developed through chemistry teaching for which different strategies and models of teaching are to be developed. Traditional method of “Chalk and talk” cannot fulfil the objectives of providing a basis for leading aquality life.

Recently, a good deal of attention has been focused on the techniques of revitalizing class room teaching in our schools. There is a felt need for raising the quality of Science Teaching so as to achieve its proper objectives and purposes viz., to promote an ever deepening understanding of principles to develop problem solving and analytical skill and ability to apply them to the problems of the material environment and social living and to promote the spirit of enquiry and experimentation, in the day to day life.

While Science is expanding at a terrific pace till very recently even in the educationally advanced countries, little attention was paid to any serious improvement and innovation in the teaching of Science and Mathematics.

After varied and intensive study and observation it is found that the system of teaching now-a-days in schools is quite mechanical and routine,
which cannot inculcate and enhance values among the students. Though there were many changes in syllabus, students do not have proper perception due to the negligence of teaching methods by the present pedagogue. The main objective of the investigator in selecting this topic is to convey her rational and wide understanding towards hidden values inculcation/development. It is believed by the investigator that the present traditional methods could not improve the values of students to a desirable extent. Considering that chemistry is the area of concern, special attention should be paid to chemistry education. Modern view about the nature of chemistry is to provide value education through hidden curriculum of chemistry and bring about attitudinal changes among the secondary school students. The new strategies/model developed will be more useful in the teaching learning process.

5.1. Statement of the Problem

“An experimental study of imparting Values through Hidden Curriculum of Chemistry among secondary school students.”

The main objective of the present experimental study is focused on the development of hidden values using a suitable Model of teaching chemistry among the secondary school students. The purpose of the present research is to know how far the hidden values could be inculcated / enhanced through teaching chemistry.

5.2. The objectives of the study are

- To identify the values hidden in the chemistry curriculum of secondary school level.
5. To develop a suitable Model for Value Development in Chemistry Education (MVDCE) for teaching chemistry to enhance the hidden values among Secondary School students.

5. To test the impact of MVDCE on the development of values among Secondary School students.

5.3. The hypotheses formulated for the present study are

- There are values hidden in the chemistry curriculum of secondary school level.
- A suitable Model MVDCE of chemistry teaching will enhance the values among secondary school students.
- The developed model MVDCE of chemistry teaching has greater impact on enhancing the values among secondary school students when compared to traditional method of teaching.

5.6. Design of the study

Two group Randomized matching group technique with Pre-test – post-test design

The researcher selected the true Experimental design. Experimental method and Randomized matching group technique with pre-test -- post-test design were selected in the study. On the basis of the pre-test results the Control Group (CG) and Experimental Group (EG) are selected by tossing the coin. The traditional Method and developed model MVDCE of teaching are taken as independent variables for teaching CG and EG respectively in conducting the experiment, whereas the development of values in the hidden curriculum of chemistry among X class students as dependent variables. Region, (rural and urban), gender (girls and boys) are taken as background
variables. At the end of the treatment to CG and EG, the Post-Test is administered to both the groups to find out the impact of MVDCE.

5.5. Selection of sample :-

The two schools namely Roman Catholic Mechanical High School in Rajahmundry urban and ZillaParishad High School, Gadala in Rajahmundry rural were selected for the study. The total sample selected for the research is 160 students of X class. Among 160 students 80 were from rural and 80 were from urban region. Among 80 rural sample, 40 were in the control group (CG), and 40 were in the experimental group. In each group of this 40, 20 were Boys and 20 were Girls. The researcher administered the pre-test to the students of X class. Basing on the pre-test scores using randomized matching group technique EG and CG were obtained.

5.6. Variables of the Study

The following variables were selected for the study.

**Independent Variables** :- Traditional method of teaching, and the developed model of MVDCE.

**Dependent Variables** :- Value levels of Food and Nutritive Value, Health and Hygienic Value, Medicinal Value and Environmental Value.

**Controlled Variables** :- Class, Previous value levels of the students, teacher variability, content taught, period of teaching, duration of teaching, and time of teaching.

**Background Variables** :- Region (Rural and Urban), Gender (Boys and Girls).

5.7. Selection of the Predominent hidden values of chemistry curriculum :-
Information sheet – I prepared and collected data from the subject experts, Teacher educators, faculty of RIEs, CTEs, DIETs and physical science teachers in total 100 in the study to identify the values developed unknowingly and classified into 4 major values namely Food and Nutritive value, Health and Hygienic Value, Medicinal value, and Environmental value.

Information sheet – II prepared and collected data from 100 physical science teachers, subject experts, and teacher educators to select the components of 4 identified values of teaching chemistry. Selected 10 components to each value.

Information sheet – III prepared and collected data from 100 physical science teachers who are teaching VIII, IX, and X classes to identify the suitable class of students where the 4 major values that could be developed / enhanced. Identified X class chemistry curriculum is most suitable among VIII, IX, and X classes according to the obtained ranks. Hence X class is selected for the study.

Information sheet - IV prepared and collected from 100 chemistry teachers teaching X class following Andhra Pradesh State Governmentsyllabus to identify the content through which the 4 values could be developed / enhanced among X class students. Identified 4 units best suitable for the 4 values from X class chemistry syllabus as per the ranks obtained.

5.8. Tools used for the study :-

1. Tool – I  An Attitude Scale used as a Pre-test. It was prepared in general, and administered to X class students both rural and urban sample. Basing on the pre-test scores students were divided into CGs
and EGs in each of the rural and urban regions using the Randomized matching group technique.

2. Tool – II is the Preparation of Teaching Model MVDCE :- A model MVDCE based on Philosophical, Sociological and Psychological Principles is developed for teaching chemistry for the enhancement of values hidden in chemistry curriculum.

3. Tool – III is the Preparation of Lesson Plans :- Thirty lesson plans in each of traditional and experimental strategies in 4 units of chemistry were prepared.

4. Tool – IV An Attitude Scale used as a Post-test. It was prepared and administered to X class students both rural and urban CG and EGs for testing the impact of the Model MVDCE developed.

The above tools were validated and tried out before conducting the experiment.

5.9. Procedural Details :- Pre-test was administered on the sample for grouping the students as CG and EG with background variables region and gender. The EG and CG were taught using the developed model MVDCE of teaching, and the traditional method of teaching chemistry respectively for a period of 80 days for the enhancement of values hidden in chemistry curriculum among students of X class. At the end of the treatment, Post-test is administered to both CG and EG with the background variables region (rural and urban) and gender (female and male).

5.10. Analysis and Interpretation of data :- The data was analyzed in 3 sections under the headings “Preliminary Analysis”, “Differential Analysis”, and
“Co-relational Analysis”. Simple statistics means, difference of means, percentage of means and valid percentages are used in the “Preliminary Analysis”, t-test and ANOVA were used under “Differential Analysis”, and Pearsons product moment coefficient of correlation in Co relational Analysis were used in the last section.

5.11. Findings of the Study :-

The following were the findings of the study.

The research study carried undertaken in two phases. The initial survey followed by validation of the developed MVDCE model through experimentation. The survey revealed that values are hidden in chemistry curriculum in secondary school level. The 4 values that ranked highest were Food and Nutritive Value (FNV), Health and Hygienic Value (HHV), Medicinal Value (MV) and Environmental Value (EV). The possibility of developing a model of value development through chemistry teaching was verified experimentally. The impact of the model was quantitatively analyzed using statistical techniques of t-test, ANOVA, Pearson’s Product moment coefficient of correlation. The study was further elaborated by analyzing the influence of different variables such as region (rural and urban) and gender (male and female) on the value development through MVDCE.

Impact of the Model of Value Development through Chemistry Education (MVDCE) :-

To analyze the impact of MVDCE the pre-test, post-test scores were treated statistically. The results are summarized as follows.

1. A remarkable improvement in value development through chemistry teaching in the Experimental Group as compared to the Control Group as a whole, including all the 4 values namely FNV, HHV, MV and EV.
2. The Experimental Group showed a considerable improvement in the overall value Development when taught through MVDCE. The model could effectively bring attitudinal changes with respect to all the 4 values.

3. The Control Group showed no progress in the overall value development when taught through traditional method.

4. A notable enhancement in the attitude with respective to FNV, HHV, MV and EV was observed in the experimental group when compared to the control group. All these values are close to the learner in fact the students seems to own them and deem it a right to improve upon them.

5. No observable progress was noticed in the control groups with respect to FNV, HHV, MV and EV when compared to traditional method.

6. Greater attitudinal improvement was observed in the rank order of EV by followed by FNV, HHV, MV and EV in the experimental group.

**Impact of the different Background variables :-**

1. In REG the enhancement of all the values is observed more than in the RCG in overall value as well as in each of the 4 values. It implies that the impact of MVDCE is greater in enhancing the overall value and each of the 4 values FNV, HHV, MV and EV among the Rural students. So the model is applicable to the rural students also.

2. The greater attitudinal improvement was observed in the rank order of EV followed by FNV, HHV and MV in the rural experimental group.

3. In UEG the enhancement of all the values is observed more than in the UCG in overall value as well as in each of the 4 values. It implies that the
The impact of MVDCE is greater in enhancing the overall value and each of the 4 values FNV, HHV, MV and EV among the Urban students. So the model is applicable to the urban students also.

4. The greater attitudinal improvement was observed in the rank order of EV followed by FNV, HHV and MV in the urban experimental group.

5. In Boys EG the enhancement of all the values is observed more than in the Boys CG in overall value as well as in each of the 4 values. It implies that the impact of MVDCE is greater in enhancing the overall value and each of the 4 values FNV, HHV, MV and EV among the boys. So the model is applicable to the boys also.

6. The greater attitudinal improvement was observed in the rank order of EV followed by FNV, HHV and MV in the boys experimental group.

7. In Girls EG the enhancement of all the values is observed more than in the Girls CG in overall value as well as in each of the 4 values. It implies that the impact of MVDCE is greater in enhancing the overall value and each of the 4 values FNV, HHV, MV and EV among the Girls. So the model is applicable to the Girls.

8. The greater attitudinal improvement was observed in the rank order of EV followed by FNV, HHV and MV in the girls experimental group.

**Research Outcomes** :-

1. The research has enabled to identify specific values which can be integrated with Chemistry Education. Understanding a broader perspective of Chemistry teaching that can bring an overall development in an individual. Thus chemistry could contribute to building a holistic personality rather than imparting mere knowledge.
2. The Model of Value Development through Chemistry Education (MVDCE) added a new dimension to teaching of chemistry beyond the prescribed syllabus.

3. The MVDCE model enhanced chemistry teaching to meet the needs of the students for leading healthy, happy and peaceful life in addition to acquiring chemistry knowledge.

4. The MVDCE model enhanced the alternative frame of reference by stimulating divergent thinking of concepts in chemistry relating to values, thus bringing students closer to the problems of life.

5. The MVDCE emphasized on contextual approach to conceptual approach to chemistry teaching. This helped to build in the context of the applications which are appropriate to the interest of the students where the students critically analyzed the immediate problems and attempted in solving them scientifically such as pollution and its impact of food habits, carbon dioxide and its presence in aerated drinks, nutritive value of food on our health and so on.

6. The study helped to establish how structured learning strategies can harness maximum potential among the students.

7. Scientific reasoning skills both in values and concepts showed improvement of fusion of values in chemistry teaching.

5.12 Educational Implications:-

Implications for teachers:-

1. Classrooms to be designed effectively to transmit values.

2. Chemistry is to be related to human life and make it meaningful.

3. Make chemistry familiar and very close to the student’s life.
4. Make the students realize how chemistry is interwoven with human life, without which life becomes miserable.

Implications for the schools :-

1. Organizing discussions, meetings among chemistry teachers and students on value development and its impact.
2. Provide opportunities for the teachers to learn more about models related to value development through chemistry teaching.
3. Extending support to science teachers for doing action researches in the area of value development.

Implications for Policy makers :-

1. Designing of science curriculum that is need-based and value oriented.
2. Text-books to be associated with work-books, hand-books, field work and diaries.
3. Organizing in-service programmes refresher courses, orientation programmes on value development through teaching different school subjects.
4. Revising teacher education curriculum of different subject methodologies with respect to integration of values with the content.
5. Strengthening the extension services through different media.

Recommendations

On the basis of the observations, the following initiatives are recommended for enhancing the hidden values of chemistry teaching among the secondary school students of X class.
1. In-service Programmes, orientation programmes Seminars and Conferences are to be arranged for Secondary school teachers on value development among students.

2. Value-education through teaching various subjects are to be telecasted in country wide classrooms and in Tele-school programmes.

3. Giving training to pre-service teacher trainees on value-development among students through teaching.

4. The National Institute of Nutrition with the help of NCERT can organize dietary orientation programmes on heart healthy foods in secondary school complex programmes.

5. NIN can supply books to schools or school complexes on low cost basis for promoting nutritious and low calorie food stuffs.

5.13. Suggestions for Further Study

The scope of the present piece of research is limited only to study the importance of the inculcation of the hidden values of chemistry teaching for the students of X class in Secondary schools.

1. The present study is on the students of X class only, and suggested among VI, VII, VIII, and IX, XI, XII classes also.

2. The present study is designed to impart values of chemistry, and it is suggested to other curricular subjects also.

3. This study is conducted only on 4 selected values namely Food and Nutritive value, Health and Hygienic value, Medicinal Value, and Environmental Value and it can be designed for few more values also.

4. The present piece of research is open for a further study on a wider sample.
5. A study can be conducted to enlighten the home-remedies with the help of Naturopathic and Ayurvedic practitioners on secondary school students.

6. ICDS can organize studies on improving the condition of children suffering from malnutrition among secondary school students.

7. Health Camps are suggested in Promoting healthy habits to school children.

8. The model MVDCE of value development can be applied in other educational programmes such as curriculum construction and evaluation techniques etc.

9. This type of study can also be conducted for examining the interaction effects among methods.

5.14. Conclusions

This study sought to determine the effectiveness of MVDCE on the enhancement of the values, hidden in chemistry curriculum of secondary school students. The findings revealed that there are significant main effects of treatment on enhancement of values. It was found that developed MVDCE model is effective in developing the 4 values food and nutritive, health and hygienic, medicinal, and environmental and enhancing the values of chemistry curriculum in students.

The study found that students when encouraged by providing opportunities to fit in the modern science age, and these values of chemistry helped to improve the selection of each and every item occur in the modern world which gives comforts and are essential in the modern life. The pedagogical approaches of learning in groups, cooperative learning and collaborative learning facilitate autonomous learning benefit the students more, provided the proper guidance and motivation from the trained teacher.
This type of studies helps in shaping the personalities as said by D.S. Kothari. The baviours of the students in this experimental group differ from the students of the control group.

The model developed by the investigator created an inspiration among students to take chemistry as the main subject in their future studies. Moreover the enhancement can be flashed on the enhancement of hidden values through this teaching model. This model of teaching help the students to answer the questions on values without fear. During the practice of the model in the class it was observed that the students were joyful and also they took part actively in the classroom without any burden and drudgery.

Most of the researchers, experts, and educationists are showing attention and importance to work on the hidden curriculum, and to explain the way it is connected to the teaching of the school subjects in the formal curriculum. As this is an experimental research, at high school level we can enhance the values through teaching the subjects. These values are the applications of chemistry in their daily life.