AN EXPERIMENTAL STUDY OF IMPARTING VALUES THROUGH HIDDEN CURRICULUM OF CHEMISTRY AMONG SECONDARY SCHOOL STUDENTS.

Synopsis submitted
To
SRI PADMAVATHI MAHILA VISVA VIDYALAYAM, TIRUPATI

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By

SUGUNA VADREVU, M.Sc., M.Ed.

Under the guidance of

Prof. CH. VIJAYA LAKSHMI, M.Sc., M.Ed., Ph. D.
Former Dean
Department of Education
S.P.M.V.V. TIRUPATI

DEPARTMENT OF EDUCATION
SRI PADMAVATHI MAHILA VISVA VIDYALAYAM
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SYNOPSIS

Introduction

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 requires 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 for the welfare of the entire humanity of universe. Therefore, the knowledge of chemistry is to be used intelligently.

Chemistry teaching today is not so simple as it was in early fifties. Now in the existing school and class-room conditions chemistry teaching become a challenge in developing the scientific attitude and values hidden in Chemistry. No longer have the traditional methods of teaching chemistry alone fulfilled the demands of life of the students.

Now the questionarises—How to make chemistry effective and interesting, so that the objectives of teaching science as envisaged in National Policy of Education (1986), could be achieved? Does chemistry teaching mean only providing theories, factual information, learning few applications like preparation of detergents, medicines, dyes etc., or something else? Are there any values or objectives hidden in the chemistry curriculum which may help the present generation in protecting environment, leading a happy, healthy and peaceful life, without diseases? How to find out the hidden treasure of chemistry? How to pass it safely to the students while teaching chemistry? Can a strategy be developed?

The present study is primarily aimed to find out whether the inculcation of hidden values is possible in teaching chemistry in the regular teaching classes. Can we find out the hidden values of chemistry? Which class is possible for the inculcation, And which units facilitate to inculcate the hidden values among students in chemistry teaching? Is it possible to prepare a model of chemistry teaching for inculcating and developing of hidden values of chemistry among the secondary school students?
Keeping in view the above questions, here is an effort is made to develop a suitable model of chemistry teaching in order to inculcate / enhance the hidden values among secondary school students.

The investigator opined that no doubt the present traditional methods of teaching Chemistry are successful in imparting Chemistry knowledge to some extent but not attempting to develop essential values for leading healthy, happy and peaceful life among chemistry students. Hence the researcher worked on the topic

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

The objectives of the study are

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

The hypotheses for the present study are

- There are values hidden in the chemistry curriculum at secondary school level.
- It is possible to develop a suitable model MVDCE of chemistry teaching for enhancement of the values among secondary school students.
- The developed model MVDCE of chemistry teaching has greater impact on imparting/enhancing the values among secondary school students when compared to traditional method of teaching.

Sub hypotheses :-

1. There is significant impact of region on the Food and Nutritive Value development through MVDCE among secondary school chemistry students.
2. There is significant impact of gender on the Food and Nutritive Value development through MVDCE among secondary school chemistry students.
3. There is significant impact of region on the Health and Hygienic Value development through MVDCE among secondary school chemistry students.

4. There is significant impact of gender on the Health and Hygienic Value development through MVDCE among secondary school chemistry students.

5. There is significant impact of region on the Medicinal Value development through MVDCE among secondary school chemistry students.

6. There is significant impact of gender on the Medicinal Value development through MVDCE among secondary school chemistry students.

7. There is significant impact of region on the Environmental Value development through MVDCE among secondary school chemistry students.

8. There is significant impact of gender on the Environmental Value development through MVDCE among secondary school chemistry students.

Variables of the Study

The following variables are selected for the study.

**Independent Variables** :- The developed model of teaching MVDCE.

**Dependent Variables** :- The value development is focused on the attitudinal changes with respect to the components of FNV, HHV, MV and EV. Levels of Food and Nutritive Value, Health and Hygienic Value, Medicinal Value and Environmental Value.

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

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

**Review of Related literature** :-

The following studies were referred under review of related literature.

Majority of the researches on the achievement, methods, Models of teaching, inculcation of awareness on the hidden value of chemistry teaching were identified from the above contextual literature.
There are researches are on the growth and development of the pre-school children and on infants and nutritive values of food and on the awareness of values of foods. There are researches on healthy, hygiene, food safety control procedure, useful cosmetic care, how modern cosmetics, boutiques and colors affect the health, why we need HACCP values available on the market products and on useful cosmetic herbs.

Some researches stressed mostly on home remedies, vegetables on health, and on some medicinal plants and their uses in curing the diseases. Usage of home remedies by the material in and around the houses gives no side effects. By using fruits, vegetables, herbs, and some locally available materials in the houses some diseases can be prevented and some diseases can be controlled and some diseases can be cured with little chemistry background.

There are researches on how threat occurs in environment and lays stress on protection of environment, common environmental toxins and on hazardous chemicals. A person with knowledge of chemistry observes do’s and don’ts on environment and act accordingly.

There are researches on hidden curriculum only on clinics, schools, Medical students, Social studies class, and Mathematics.

Hence researcher selected the hidden curriculum of chemistry, on chemistry teaching at school level. So the investigator selected the topic as

“An Experimental Study of imparting Values through Hidden Curriculum of Chemistry among Secondary School Students.”

Design of the study

The researcher selected true Experimental design. A two group design with a randomized matching group technique with pre-test -- post-test design is selected. 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 through hidden curriculum of chemistry 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 verify the impact of MVDCE.
Design of the sample :-

Selection of the schools :- The two schools namely Roman Catholic Missionary High school in Rajahmundry urban and ZillaParishad High School, Gadala in Rajahmundry rural were selected for the study.

Selection of the students :- The total sample selected for research is 160 students of X class. Out of 160 students 80 are from rural and 80 are from urban regions and out of each of group 80, 40 were in CG and 40 were in EG. Among each group of this 40, 20 were Boys and 20 were Girls. The researcher administered the pre-test to the students of X class.

Selection of Values :-

An Information sheet – I is planned, prepared and administered in the study to identify the values developed unknowingly and classified into 4 major values namely Food and Nutritive value (FNV), Health and Hygienic Value (HHV), Medicinal value (MV), and Environmental value (EV).

Selection of Components :- An Information sheet – II prepared and used to select the components of 4 identified values of teaching chemistry. 10 components were selected on each of the 4 values.

Selection of Class :- Information sheet – III prepared and used to identify the class in which the 4 major values that could be developed to a maximum extent from the syllabus. Identified X class syllabus scored the highest value. Hence X class is selected for the study.

Selection of Content :- Information sheet - IV prepared and used to identify the content in which the 4 values could be developed maximum. Identified 4 units from X class chemistry syllabus is suitable.

The four units from X class text book or syllabus are convenient in the maximum inculcation of values in teaching Chemistry among the X class units. So these 4 identified units had taken for the purpose of her research.
<table>
<thead>
<tr>
<th>Value</th>
<th>Name of the Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and Nutritive Value</td>
<td>Carbohydrates and Proteins</td>
</tr>
<tr>
<td>Health and Hygienic value</td>
<td>Lipids and Oils</td>
</tr>
<tr>
<td>Medicinal Value</td>
<td>Acids, Bases and Salts</td>
</tr>
<tr>
<td>Environmental Value</td>
<td>Carbon and its Compounds</td>
</tr>
</tbody>
</table>

In the above units selected for the study not only the selected values against but also the other values are also can be developed. For convenient sake the researcher selected only one unit for one value to be developed.

**Design of the Tools :-**

1. Tool – I is a Pre-test :- An Attitude Scale – I used as pre-test planned, prepared in general consisting of 40 items in total and 10 items in each value on the selected 10 components and administered to X class students both rural and urban. Basing on the pre-test scores students were divided into CGs and EGs using the Randomized matching group technique.

2. Tool – IV is a Post-test :- An Attitude Scale – II used as Post-test planned, developed in the identified 4 units consisting of 40 items in total and 10 items in each value on the selected 10 components and administered to X class students both rural and urban, for testing the impact of the model developed in enhancing the values hidden in chemistry curriculum.

**Development of MVDCE :-**

Jean Piaget did some experiments in science curriculum. Theories and results of Piaget’s experiments on students developed the attitudes, curiosity, logical thinking and thought provoking ability among students. Modern educational technology and practice have been grown largely out of work of Pestolozzi, Frobel, and Herbert. Teaching methods inevitably constitute significant aspects of the human effort to educate. Developing attitudes, curiosity, logical thinking and thought provoking ability strategies like Brainstorming, quiz, seminars, discussion between peer-group, teacher student were selected for the study. Sociological basis gives stress on the student's co-operative learning, Group learning, collaborative learning in the class. Nurturant Effect describes the direct and implicit results of instructions. Principle of reaction explains the procedure in which the teacher
deals with the reactions of the students, Basing on these philosophical, sociological and psychological theories the investigator prepared the teaching model for value development in chemistry education (MVDCE).

**Preparation of lesson Plans based on MVDCE:** The investigator prepared thirty lesson plans basing on the MVDCE for teaching the experimental group.

The above tools all are validated to try out for reliability and validity, and established that all the 4 tools are valid and reliable.

**Procedure followed:** Administered pre-test on the sample for grouping CG and EG students. The EG and CG were taught 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.

**Scoring:**

Values are expressed in terms of attitudes. So to measure the values an Attitude Scale is planned, prepared, and administered. A five point scale was prepared to know the value levels of the students before and after the experimentation. As the present investigation is an experimental type of enquiry, the Likert’s type scale is adopted as the tool of investigation to gather systematically the opinions or values of students.

Each statement in the attitude scale is given five ratings a, b, c, d and e and was asked to write the appropriate alphabet in accordance with their agreement.

The following ratings are given.

5  -- maximum extent  
4  -- Greater extent  
3  -- moderate  
2  -- low  
1  -- very low

**Statistics used:**
The following are used for analysis and interpretation of data.

1. Inferential Statistics
2. Differential Statistics
3. Co-relational Statistics

**Analysis and Interpretation of data :-** Though some of the descriptive and inferential statistical techniques employed to analyze the data, to serve the purpose of the present research work, for higher accuracy and in depth analysis sophisticated techniques would have been used in all dimensions of this work.

The data was analyzed in 3 major headings Preliminary Analysis, Differential Analysis, and Co-relational Analysis. Used simple statistics means, difference of means, percentage of means, valid percentages, in the preliminary analysis, t-test and ANOVA in differential analysis, Pearson co-relation coefficient in co relational analysis.

**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 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.

**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.
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.

Conclusions

This study sought to determine the effectiveness of MVDCE on imparting values, hidden in chemistry curriculum of secondary school students. The findings revealed that there is significant main effect 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 given 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 help in shaping the personalities as said by D.S. Kothari. The characters of 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 inculcation of hidden values through this teaching model. During the practice of the model in the class it was observed that the students feel joyful and also they took part actively in the classroom without any burden and drudgery.

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