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Teaching, Learning and Evolution: With Reference to Chemistry

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Abstract: The main aim of this article is to give an overview of the role of teacher within 'Teaching & Learning' of Chemistry; to illustrate the wide impact of 'Learning by Doing' through non-conventional teaching methods. Traditional teaching methods were historically fixed & inflexible, which support only to the active learners. Therefore, a clear need to seek new teaching methodology in teaching Chemistry exhibit a paradigm shift from conventional classroom teaching method to non-conventional teaching method, which is learner centric. Some of the non-conventional methods to be adopted are learning through active participation by the students through seminar, quiz, audiovisual aids and project by grouping the students into active learners and passive learners and creating a quality circles in which the active learner is at core and the passive learners are at the periphery. Due to such circle the knowledge and technical literacy transmits and exchanges from the centre to the peripheral levels, as a result number of active learners within the circle increases.

Key words: *Conventional, Non-conventional, Participatory Teaching, Learning & Evaluation, Project.*

I. Introduction

Teaching – Learning & Evaluation:

These words are not new for the teachers but because of NAAC, these words are become more familiar to us. Though these are not isolated from each other but they are linked with each other.

In all this process teacher acts as catalyst, he catalyzed the learning through various innovative & interesting teaching methods.



Quality of Education

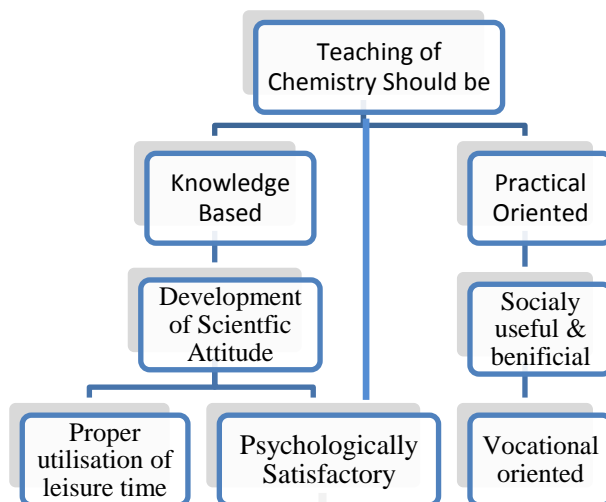
Good teaching results good learning & both results to quality education.

Teaching → Learning → Evaluation → Quality of Teachers & Learners

Aims and Objective of Teaching Chemistry:

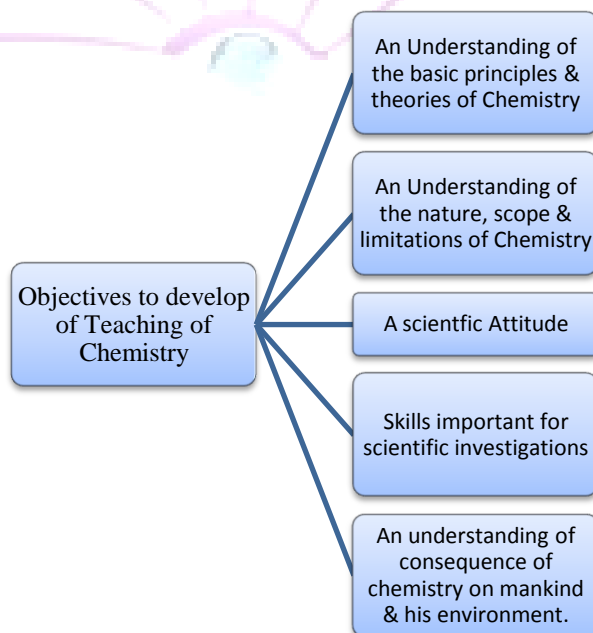
The aim of teaching chemistry refers to the advantages that can be drawn or purposes that can be served by the study of Chemistry are as follows:

- 1) **Knowledge :** The teaching of chemistry should increase the knowledge of individual and it should help him in understanding himself in his day today life and his environment.
- 2) **Practical :** The knowledge which he gained should be of applied for himself and then for his environment. The knowledge should be related to the materials with which the students is familiar & not be an imaginary.
- 3) **Development of Scientific Attitude:**
Chemistry being a physical science it aims at the development of scientific attitude among the learners. It should be helpful in removing the superstitions, false beliefs; wrong notations spread in the society and cultivate habits of proper reasoning, observation and experimental action. To develop the scientific attitude and science related values amongst students.
- 4) **Social aim :** The study of Chemistry should help inculcate social virtues among the student for leading an adjusted social life and contributing towards welfare and progress of society.
- 5) **Vocational :** The knowledge of Chemistry in the present day is essential for almost all the professions and vocation. To achieve this aim prepare out student for the different occupations by providing related knowledge, i.e., various short term courses will be organized like preparations of soaps, detergents, phenyls, cosmetics, chalk, candles, perfumes etc.
- 6) **Utilization of leisure time :**
The knowledge of Chemistry should be useful to students to learn ways and means of utilizing his leisure time more fruitfully.
- 7) **Psychological Satisfaction :**
Teaching of chemistry provides to student various opportunities for satisfying his various psychological needs and this satisfactions help for his bright future.



II. The Objectives of Teaching of Chemistry or any Physical Science

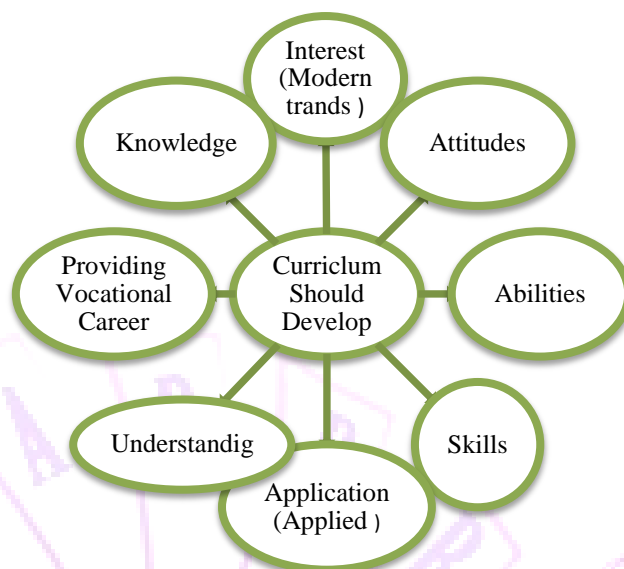
- 1) To develop an understanding of the basic principles and theories of Chemistry.
- 2) To develop an understanding of the nature, scope and limitations of Chemistry.
- 3) To develop a scientific attitude.
- 4) To develop skills important for scientific investigations.
- 5) To develop an understanding of consequences of Chemistry or Physical Science on man and his environment.



To inculcate these aims & objectives among the students “**The Board of Studies in Chemistry**” of every University prepares the syllabus / curriculum on basis of these points-

1. To make students interested in Chemistry.
2. To know the students that, the important role of Chemistry in their life.
3. To inculcate the scientific culture.
4. To provide a training to students in method of science.
5. To emphasize upon students the role of Chemistry on social behavior.
6. To prepare students for those vocational courses which require an adequate knowledge of Chemistry
7. To increases students understanding to a optimum level that he can understand various concepts and theories of Chemistry

Curriculum should – develop –

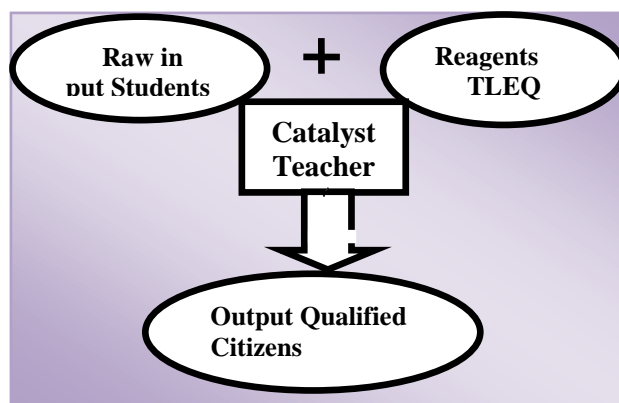


Teaching – Learning Process –

The role of Chemistry Teacher: As a Catalyst.

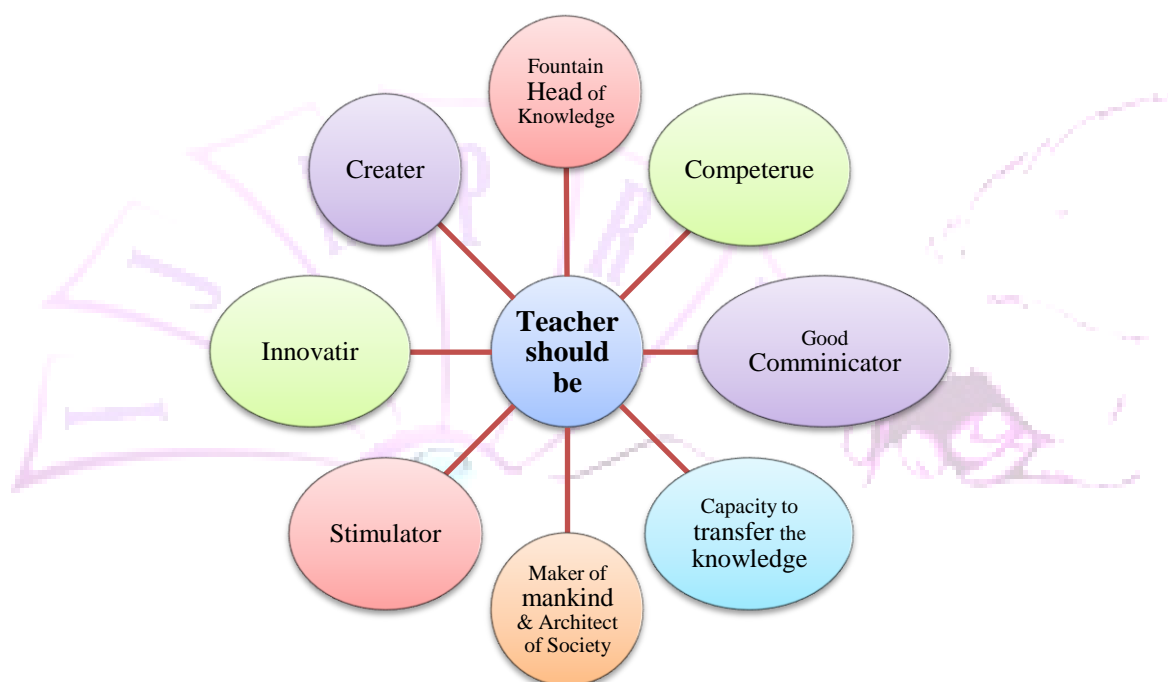
The major role can be played by the Chemistry Teacher in developing scientific attitudes among his students and this he can do by adopting various innovative interesting teaching methods. The Chemistry Teacher can accelerate the learning phenomena of students by his innovative and interesting teaching method, that's why he is known as a Catalyst.

There are two types of catalyst one is positive catalyst which increases or accelerates the rate of reaction and the other is negative catalyst which decreases or retards the rate of reaction. In the same manner, teacher can either accelerates or retards the learning process.



So to develop the quality of education and overall development of the student the Chemistry Teacher should always alert, punctual, refresh & update his knowledge time to time, adopt new & innovative teaching method, involve in all supportive activities of the college.

Ideal Teacher: Qualities of Teacher



III. Teaching Methods

Chemistry Teacher can use one or more of the following methods for developing student and to improve the quality of education. These methods are the steps to achieve the goal of quality education & overall development of students.

- 1) Chalk & Talk Method – Lecture
- 2) Demonstration – Practical
- 3) Use of teaching aids – (Audio – Visual, charts & models)
- 4) Use of multimedia – Computer – Internet
- 5) Seminar –
- 6) Quiz – Objective (multiple choice question) Test

- 7) Industrial Visits
- 8) Vocational Training (Short term courses)
- 9) Project.

If the Chemistry Teacher uses above all the methods as per the need it will give definitely results.



As per my experience in my college along with my colleagues & student I used almost all the methods as described above. Here I am going to explain in details, the need and experience of one method which is successfully implemented in my College.

Vocational Training: Short Term Courses:

In the modern world majority of the vocational career courses depend to a large extent on the basic knowledge of Chemistry. To achieve the vocational aim and to develop the skills of students we can organize the short courses for the preparation of Ink, Soaps, Detergents, Phenyl, Candles, Chalk, Rose water, Perfumes, Jam, Jelly, Syrups etc. The courses will be providing the students with a profitable leisure time work. The majority of students starts their business and cash this knowledge and skills of Chemistry to earn money.

Technical Support:

Initially we take the technical support from MCED, MIT-CON and DIC. The required raw materials and packing material will be easily available in the market.

Certificate:

After completion of the courses the participants will be honored by issuing the certificates. In future if they desired to start this activity in large scale as their work to obtain and butter, this certificate will be helpful to create the loan from banks or any other finance corporation.

Project Method: Best source of learning by doing

The Project method inculcates leadership and entrepreneurship qualities among the students. It is based on the following principles:

1. Learning by doing
2. Learning by living
3. Learning through group working.

The essence of the project is the carrying out of useful task (Result) by grouping the students into active learners and passive learners and creating quality circles in which the active learner is at core and the passive learners are at the periphery. Due to such circle the knowledge and technical literacy transmits and exchanges from the centre to the peripheral levels, as a result number of active learners within the circle increases. This group of quality circle working cooperatively. The project method may consider as a kind of life experience which is an outcome of a desire of students. This is a method of spontaneous and incidental teaching. "Learning by Doing" may be a better meaning of project method, because life is full of project and individuals carry out these projects in their everyday life.

Classification of Project:

The projects may broadly be classified as :

1. Individual Projects.
2. Social or Group projects.
3. Proper selection and proposing.
4. Planning of the project.
5. Implementation (Executing) of the project.
6. Evaluation of the project from the record.

The Essentials of a good project:

1. It should be worth for the individual or group.
2. It should be related to Science or Chemistry
3. It should be time bonded or timely.
4. It should be challenging.
5. It should be feasible.

Teacher should clearly define the purpose of the project and the principle of the project.

IV. The Role of Teacher

In this method the role of teacher is

1. As a friend and philosopher.
2. As a stimulating agent – he encourages the students to work collectively in the group
3. As a mentor / promoter he helps to the students in solving their problems and to avoid the mistakes.
4. As a Psychologist: during the execution of the project teacher should maintain healthy and fearless or tension free atmosphere.

V. Merits of the Project:

1. It helps to break the chains of ignorance of the students.
2. Through this activity students acquire the various skills like keenness, accuracy of observation, spirit of enquiry and knowledge of the subject.
3. It develops the spirit of cooperation and social discipline.
4. It creates a interest on natural and also manmade situations.
5. The vision and attitude of the students will be changed.
6. It upholds the dignity of labor.
7. It introduces the democracy in education.
8. It increases the closer relationship among the teacher, friends and overall the subject.
9. It develops self confidence and self discipline.
10. A project tends to explain the real nature and role of the Chemistry in our daily life.
11. It stimulates the student towards creative, constructive and positive thinking.
12. It provides an opportunity for mutual exchange of ideas.

Our students along with teacher experienced

**“I hear, I forgot
I see, I remember
I do, I understand.”**

By performing the following projects-

- 1 To Prepare Pigments & Poster Paints Using Various Chemicals & Reagents.
- 2 Determination of Content of Cold Drinks Available In The Market
- 3 Extraction of Rose Oil.
- 4 Preparation of Soya bean Milk & Its Comparison With Natural Milk
- 5 To Study The Presence of Insecticides & Pesticides In Various Fruits & Vegetables
- 6 Study Of Constituents of An Alloy
- 7 Preparation of Potash Alum From Scrap Alum
- 8 To Study Some of The Common Food Adulterants Present In Different Food Stuffs
- 9 Determination of Caffeine In Tea Samples
- 10 To Determine which Antacid could Neutralize the most Stomach Acid
- 12 Variation of Conductance with Temperature in Electrolytes
- 13 Measuring the Amount of Acetic Acid In Vinegar.
- 14 Estimation of Content of Mg in various talcum powders.
- 15 To find the Contents of Tooth Powder
- 16 To dye wool, cotton and silk clothes with malachite green
- 17 To test for impurities and contaminants of various water sources.
- 18 Extract Nicotine Sulphate from Samples of Cigarettes
- 19 To Study the Preparation of Ink
- 20 Preparation of Soaps, Detergents & Phenyls.
- 21 To study and calculate the content of ascorbic acid in different citrus fruits

VI. Evaluation

- ❖ Teacher can search the potentials & knowledge of his students through various evaluation methods.
- ❖ Only annual examination is not a sufficient tool for evaluative the students. Different tools can be used as described below.



VII. Conclusion

The project method provides a practical approach to learning of both theoretical and practical problems. This method has been found more suitable for teaching and learning. Through this method we can prepare various teaching aids, charts, models from household articles or house waste related to Chemistry and other science which will be use full for the department and their juniors.

This method of teaching is very useful for the student as –

1. It provides the students an opportunity to make the use of Chemistry in daily life.
2. It provides the students to learn the production skill and to cash the skill for monitory gain.
3. It provides the knowledge of manufacturing, packing and marketing strategies.
4. It develops the self confidence and entrepreneurship.
- 5.

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