Teaching Methods for the Effective Teaching of Biological Science at Higher Secondary Level

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Abstract

Biology has gained the worldwide recognition for the pace of development. Modern civilization owes its advancement to the progress of various teaching subjects effectively. Biology is intimately involved in every moment of life. Thus effective teaching of biology at higher secondary level is more important to cope up with the innovative changes going on day by day. In this regard effective teacher of biological sciences are needed for the development of society. The teacher must possess a basic qualification in the subject. A lack of basic skills also handicaps the teacher to teach effectively. Like other subjects Biological Science teaching also require some specific instructional procedure by introducing new strategies, tactics, devices, techniques and maxims of teaching. Instructional procedure depends what a teacher does in the classroom by employing various mechanisms of teaching. The present research paper is the outcome of the research done to identify the teaching methods for effective teaching of Biological Sciences.

INTRODUCTION :

Advent of science and technology has proved that teaching is very complex and dynamic activity. It has been found that it is a practical activity and a social phenomena. The dynamic nature of society has influenced both, the teacher and the students equally. Today the student and the society expect more from a teacher and. a school than they expected in the earlier days. Becoming a successful teacher presents a greater challenge today than at any previous time in the history.

As we entered in twenty first century the relative importance of Biological Science is increasing day by day. In school or the college a science student thinks himself superior to other students, so is the position of Bio-science teacher, but the analysis of the students result in bio-science shows the poor· performance of the students in the subject. The questions strikes in the mindWhat is the cause of this poor performances of the pupils? How should bioscience teachers of tomorrow be prepared? How should they be educated so that they may be able to change the behaviour of pupils in desired
direction? A teacher well versed in the content is enable to produce desired behavioural changes in the students behaviours in bio-science subjects. Does something more than subject content and general teaching activities needed to a effective biology science teacher?

First of all, it is necessary to identify the activities which are mostly needed for prospective bio-science teachers. There is an imperative need for developing teaching model for bio-science teachers based on specific skills and techniques for effective bio-science teaching, so that teacher-education institutions may be able to produce competent teachers. The investigator attempted to evolve such model for effective bio-science teachers. The problem was stated as.

***Statement* of *the Problem*- "Teaching methods for the effective teaching of Biological Science at higher-secondary level."**

Objectives of the Study:

The study was designed and conducted to realize the following objectives:

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1. To identify the teaching methods for the effective teaching of Biological Science at higher secondary level.
2. To identify the teaching techniques for the effective teaching of Biological Science at higher secondary level.
3. To explore the instructional procedure for teaching Biological Science at higher secondary level.
4. To evolve instructional module for teaching Biological Science at higher secondary level in terms of techniques and components of content of teaching.

The methodology, design of the study and procedure were conditioned by these objectives as to draw inferences of the study.

HYPOTHESES:

The study was an exploratory in nature and based on Robert Glaser Basic Model of teaching which has been described and illustrated at length by John D. Dececco in his book entitled, *The Psychology, of Learning and Instruction (Educational Psychology).* The hypotheses could not be formulated and the findings are based on actual observations of actual instructional procedure employed in classroom teaching by Biological Science teachers.

Research Methodology:

Method: Observation method

Population: The population for the purpose of this study was defined as the Biological Science teachers of Meerut Region, teaching the higher secondary classes of C.B.S.E. and **U.P.** Board. The Biological Science teachers are the subject in this study.

Sample: A sample of 60 effective Biological Science teachers of higher secondary level was selected by applying purposive stratified random sampling techniques. For this investigator first randomly selected 223 Biological Science teachers teaching at higher secondary level of U.P. Board and C.B.S.E. Board of Meerut region. The region include the districts— Meerut, Muzaffarnagar, Baghpat, Ghaziabad, Gautam Budha Nagar and Bulandshahr. All Biology teachers having more than three years of teaching experience were taken up in preliminary sample. The assessment of teacher effectiveness was made on the basis of combined results of three criteria (Presage criteria — Teaching Attitude and Academic qualification and product criterion — Students results). For determining the teaching attitude Minnesota Teaching Attitude Inventory was administered. For academic qualification scores are assigned to the division obtained in examination passed. For product criterion the average pass percentage of students in the subject Biology for last three consecutive years was taken. In this way three types of scores were collected for each teacher. Each distribution was converted into T-scores. So, each teacher was assigned three T-scores. Then the obtained T-scores were added and a combined T-score was assigned to each teacher. After that this ungroup data was converted into group frequency distribution and the distribution is checked for normalcy. The assumption of normal distribution was examined by chi-square test on combined T-scores distribution. Then by applying Kelley's 27% Top dichotomy the required sample size of 60 effective teachers was identified.

Tools: For selection of sample following tools are used:

1. Minnesota Teacher Attitude Inventory (Hindi Version)
2. Academic Achievements Scores of Teacher's obtained from School office.
3. Last three year pass percentage of students in the subject Biology obtained from School office.

Technique: Participant Uncontrolled Classroom Observation technique was used for identifying complete instructional procedure.

Procedure: In order to analyse the observations of the classroom, the fundamental elements of a 'General Model of Teaching' were considered most appropriate way of analysing the observed

classroom lessons of this study. A teaching model and instructional procedure generally consists of four fundamental elements. An outline of a teaching model can be explained with the help of these four elements. The following are the four fundamental elements which form the layout of a teaching module of instructional procedure : Focus, Syntax, Social System, Support System.

All observed lesson are analyzed according to the above mentioned main model of teaching. After analyzing the lecture teaching methods, techniques, skills and maxims of teaching was identified.

CONCLUSION

On the basis of analysis of the results and discussion the following inferences have been drawn.

INSTRUCTIONAL PROCEDURE OF BIOLOGY TEACHING

(a) Strategies of Teaching

It seems that biology teachers use lecture-cum-demonstration, lecture-cum-black board work and lecture-cum-question — answer strategies of teaching as its nature theoretical and practical.

These strategies involve the following tactics of teaching.

i. They introduce the new topic based on the previous knowledge to developing appreciative mass of students.
ii. The content is presented by arranging in a logical sequence which is psychologically workable.
iii. They use black broad work for floral diagrams, formula and drawing figures.
iv. They put some developing questions for providing opportunity of students participation.
v. They make use of some short stories for imparting the concept and awareness of knowledge related to their life situations.
vi. They also diagnose the students weakness for providing remediation.
vii. They provide opportunities for assimilation by assigning home work & library and laboratory work.

(b) Teaching Techniques

They use the following teaching techniques : i) Explaining, ii) Demonstration, iii) Question-answer, iv) Laboratory, v) Narration of short stories, and vi) Ruleg and Egrule system.

They use narration technique employed in telling short stories for the awareness of knowledge related to their life situations.

(c) Teaching Skills

The following teaching skills are used by Biology teachers at higher secondary level.

i. i) Skill of explaining, ii) Skill of drawing figures, iii) Skill of using black board work, iv) Skill of demonstration, v) Skill of reinforcement, vi) Skill of pacing lesson, and vii) Laboratory skill.

(d) Activities of Social-emotional Climate of Biology Teaching

It may be said that following activities are needed for generating social emotional climate of classroom for Biology teaching at higher secondary level.

i. Teachers initiation and responses are encouraging for students participation by praising and accepting ideas and feelings of the students.

ii. Teachers behaviour are more democratic as compared with authoritarian behaviour in classroom verbal interaction.

iii. The silence and confusion situations are checked by asking questions and presentation rather then giving directions.

The personal attention is given in classroom to have the rapport with students.

(e) **Maxims of Teaching**

Teachers use the following maxims of teaching for organizing and presenting his instruction: i) Simple to difficult, ii) Known to unknown, iii) Direct to indirect, iv) Particular to general, v) Part to whole, and vi) Whole to part.

IMPLICATIONS OF THE FINDINGS:

The research effort is not meaningful if it does not contribute to the existing knowledge or help of the discipline in which it has been conducted. It must have certain implications and should facilitate the growth of the discipline. Educational research should have some implication to teaching process. In the following paragraphs an humble attempt has been made to delineate the implications based on the findings of the study:

- Teaching is the most important factor in the whole formal system of education. The findings of the present study will provide new informations for the instructional procedure. It may be useful to the teacher-educators and other medical and engineering institutes involved in preparing competitive types of examinations and professional or vocational courses.
- The evolved teaching modules and teaching strategies may be used in such type of science institutes which provide objective based teaching for the field such as scientist, physiotherapy, nursing, agriculture etc.
- These teaching strategies may be helpful to those research scholars who are aspiring for Junior-Research Fellowships.
- The evolved instructional procedure may also be helpful to those employed persons who are aspiring to get through promotion test and professional growth and development.
- The evolved teaching instructional procedure may be used in our classroom situations for improving the results of the students as in the present situation the High School and Intermediate Board of Education.
- The present system of education focuses to the objectives which are to be achieved by the students rather than the content field. From this point of view of interpretation, these evolved instructional procedure are not only based on the objectives related to the students growth but also it is capable of bringing better improvement in respect of classroom teaching.
- Thus viewed, instructional procedure accelerate the growth of the students in competitive capacity and provide some basis for sustained growth and development. It may raise academic standard of science teaching.

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