CREATIVE TEACHING OF PHYSICS – A SURVEY REPORT

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INTRODUCTION

Creativity research prior to 1950 was very meagre. Guilford was the first to initiate interest in creativity research in U. S. A.[1]. The general feeling, based on research and observation, is that people who make contributions to society are not necessarily those who possess high intelligence. Research studies reveal that creative talent can be nurtured only if effective teaching methods are employed. A survey was conducted by us to know the state of Physics teaching in Amritsar Colleges. A questionnaire (see Appendix) was circulated among all the Physics teachers of those colleges. The replies received from 31 teachers contained useful information to make the teaching of Physics more effective at the college level. Some of the results, which are of general interest, are summarized in this report.

1. Motivation :

The students should be provided stimulation and motivation in one form or the other to arouse their interest in Science. The survey reveals that seventy per cent of college teachers motivate the students in the class-room and in the laboratory. Following methods are suggested by them to motivate the students :

(a) Demonstration of some interesting experiments during or after theory class, or by showing models, charts, etc. The use of audio-visual aids is considered as the most useful method of creating student's interest in physics studies.

(b) Narrating the brief history of a creative scientist or the historical background of the subject leading to a particular achievement.

(c) Describing the marvellous achievements and applications relating to the topic.

Some teachers have suggested that the repetition of lengthy mathematical derivations in the class should be avoided as far as possible and stress must be laid on the conceptual study and practical utility of the subject to make it interesting.

It is interesting to note that nineteen per cent of the respondents state that they do not motivate the students. They cite the following reasons :

(a) Syllabi framed are so heavy that no time is left in the class for motivation.

(b) The change of medium from mother tongue to English at the college level and and poor base, particularly of rural students, at the school level is a big hindrance to their learning process at the college level. Teaching them is itself a knotty problem rather than enjoyment.

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(c) The traditional methods of teaching Physics leave no scope for motivation.

2. **Laboratory :**

Ninety percent of the teachers surveyed are of the opinion that the present system of laboratory is inadequate to promote creativity; in other words, it does not promote creativity at all. Majority of the teachers argue that in the conventional type of laboratory the student is provided with cooked material, more stress is laid on the mechanical part with no scope left for creativity. The present laboratory is dull even for the teachers; the same old pattern is in vogue for the last several decades. Divergent thinking abilities are not encouraged in the conventional type of laboratory.

Yet, forty per cent of the teachers are not in favour of changing the system; they only suggest changes like (a) modernising the laboratories with the latest apparatus and (b) decreasing the teacher-student ratio. They argue that open-ended laboratory system is not feasible since the entire educational system is examination oriented.

Open-ended Laboratory System

A majority (sixty percent) of the respondents favour the open-ended laboratory system, since it helps to bring out the best talent among the students and develops divergent thinking abilities. They are of the opinion that this system should be introduced in B. Sc. II and B. Sc. III classes only, at which stage the students are somewhat more motivated and deeply interested in the subject. The responses also indicate that several of the college teachers are not fully conversant with this innovative idea.

3 **Laboratory Project/Field Work :**

Majority of the teachers (eighty eight per cent) have favoured the introduction of laboratory projects/field work at B. Sc. II and III level. But laboratory projects should be inexpensive and field work must be related to the science topics learnt in lower classes. Survey reveals that students will acquire technical skill and research capabilities by way of setting laboratory projects and broaden their scientific outlook through the field work associated with science topics.

4. **Group-discussion/Seminars/Science Fairs**

All the teachers covered under this survey favoured the introduction of group-discussion/seminars at the college level. Majority opinion reveals that group-discussions should be held regularly (once or twice a week) and at least 2-3 seminars in a year. Group-discussions/seminars should be made a part of theory/practicals and be given the due weightage, i. e. special awards/marks should be reserved for these. Some teachers have suggested that the college should invite experts/scholars from various colleges and universities to address the students very frequently and provision be made for sufficient funds (travel grants) for this purpose.

As regards science fairs, the majority of the respondants favour of holding them only occasionally.

5. **Examination-Reforms and Evaluation .**

The survey brings out the following useful suggestions to the current habit of learning by rote :

(a) Avoid setting up of 'reproduction' type of questions in the examination.

(b) Increase the number of objective type (short answer) questions and lay more stress on numerical problems.

(c) Lay more emphasis on the application of concepts.

(d) Make discussions/seminar/project work as a part of theory/practicals and give due weightage.

6. **Evaluation :**

In our survey, suggestions were invited from teachers to change the traditional system of students' evaluation. Majority opinion favours the following approach to this problem.

(a) Monthly tests should be held, and average marks of these tests should be taken into consideration in the formulation of the final result.

(b) Teachers should assess the student's performance for the whole academic session and this assessment be given due weightage.

(c) Evaluation should be done by computers and the teachers in equal proportions, and the results be declared in the shortest possible time.

Some teachers are of the view that home assignments given to the students can encourage self-study, and promote creativity. Thus weightage should be given to it.

REFERENCE

1. J. P. Guilford : *Creativity*—The American Psychologist, Vol. 4, No. 9, September 1950.

APPENDIX I

CREATIVE TEACHING OF PHYSICS

Name of Teacher.....

College.....

1. It is said that to stimulate science learning, motivation is necessary. Please suggest some ways to motivate the students in the class-room and in the laboratory.....
2. Do you motivate the students before touching the real subjects ?.....YES/No.
3. If No., then what are the reasons.....
4. Do you favour the modern Open-ended laboratory system or conventional type of laboratory where routine experiments are performed ? Please give your opinion.....
5. Is the present system of laboratory adequate to promote creativity among the students ? Give opinion.....
6. What is your opinion about the Laboratory Project/Field work ? Should these be associated at the undergraduate level ?.....
7. Group-discussions / seminars / science fairs are helpful to promote creativity. Please suggest the ways in which these can be made popular at the undergraduate level.....
8. How do you encourage the students to develop problem solving skills ?.....
9. Do you encourage the students to ask thought-provoking questions in the class ?.....YES/No
10. Our traditional system has established a way of learning by rote. How can this habit be changed ? Give your opinion.....
11. To promote creativity among the students the present system of students evaluation needs to be changed. Will you suggest some ways in this regard ?.....

Only teachers with crusader's zeal can revamp the educational system. Do *you* have a crusader's zeal ?