

## **Physical Conditions of Science Laboratories and Problems Faced by Science Teachers in Conducting Practicals in Punjab**

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### **Abstract**

This study aimed to find out the situation of physical condition of labs, equipment in labs, and use of labs during instruction, and problems faced by science teachers in conducting practicals. A questionnaire for science teachers was used as a tool of research. Eighty (80) schools from four districts of administrative division Gujranwala of Punjab province were selected as a sample of study. Findings of the study reveal that majority of the teachers were satisfied with physical condition of labs, ventilation and lighting. Majority of teachers were not satisfied with condition of furniture, apparatus storage room for equipment, safety equipments no. of worktables, space within tables and use of lab during teaching. Majority of the teachers were not able to conduct practicals due to large enrollment lack of time and space in labs, non-allocation of periods in timetable.

**Key words:** Science laboratories, science teachers, science practicals

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## Introduction

It is said that science is a way of knowing “that our goal should be to impart scientific habits of mind” and that learning must be learner centered and oriented towards process (Jane Maienschein, 2004). The phrase ‘science as a way of knowing and science as a process’ carry the conviction that science should be learned by doing. A substantial consensus had developed among investigators of ‘giftedness’ that an environment that encourages inquiry provides the best opportunities for all students to learn (Brand wein and Passow, 1989). The role of the laboratory is therefore, considered central for effective instruction. If opportunities are made available to all students with appropriate abilities and interest they will identify themselves with scientific activities with an appropriate degree of challenge (Brand wein and Passow, 1989). Inquiry is taken to be good because it stimulates all students. But then laboratories, seem important in order to allow those “students with the appropriate abilities and interests” to take up the scientific knowledge. (Jane, Maienschein, 2004)

For science to be taught properly and effectively, labs must be an integral part of the science curriculum (NSTA, 2007). A hallmark of science is that it generates theories and laws that must be consistent with observations. Much of the evidence is collected during the laboratory investigations. A school laboratory investigation (also referred as a lab) is defined as an “experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques and models (WRC 2006).

In shulman and Tamir’s(1973) review of search on science teaching, they identified three rationales generally advanced by those that supported the use of laboratory in science teaching. The rationale included(1)the subject matter of science is highly complex and abstract.(2)student need to participate in inquiry to appreciate the spirit and method of science and (3)Practical work is intrinsically interesting to students. Yager (1981) thought that science educators should treat laboratory as the “meal” the main course (P-201) rather than an “extra” or the desert after the meal (p-201). Bajah (1984) said” all the science teachers and students know that the practical work is the “gem” of science teaching (p-44). The National Science Teacher’s Association (NSTA) endorses the necessity of laboratory experiences for teaching and learning in science. Adequate support for materials, equipment and time is available for schools to maintain quality programme is critical in today’s age of science and technology. (Klein,Yager and Mc Curdy,1982 p-20). In Pakistan science

has been taught as a compulsory subject from class 1-10. Keeping in view the importance of activity based teaching it was needed to find out that how long the Science curriculum is being taught with the help of activities using labs and to what extent labs of the schools are equipped in accordance with these activities. It was further needed to know that if activity based teaching has not been taken place then what are the problems faced by teachers to provide activity based instructions to their students.

## Method of Study

### *Instrument*

For the collection of data from the selected schools a questionnaire for science teachers was developed in the light of related literature such as National Science Teachers Association (NSTA) recommendations, a position paper of the American Association of Physics Teachers (AAPT, 1992) and some local studies on lab role. The questionnaire comprised of two parts. First part related to existence of physical facilities in laboratories, while 2<sup>nd</sup> part about the problems of science teachers in managing the labs.

### *Sample of Study*

The male and female secondary schools in the public sector in Punjab constituted the population of this study. A sample of the 80 high schools (49 male and 31 female) was selected randomly from four districts.i.e. Gujranwala, Hafizabad, Gujrat and Sialkot of Gujranwala division of Punjab Province. The distribution of sample is as under:

**Table 1**

*Distribution of Sample*

District	Boys schools	Girls schools	Total sample
Gujranwala	14	08	22
Gujrat	15	08	23
Hafizabad	10	08	18
Sialkot	10	07	17
Total	49	31	80

### **Collection of data**

The questionnaires were personally distributed to the science teachers and collected back after completion. Out of 80 questionnaires 72 questionnaires were collected back.

Data collected through questionnaires were as under:

### Existence of Lab, Electric Supply and Teacher's Training

All the selected schools had science labs. Electric supply is present in all these schools. All the teachers are trained teachers have at least B.Ed degree; however only 8% teachers have attended in-service training for the effective use of science labs.

Data about satisfactions of Teachers on Physical Facilities and their Problems

Physical Facilities	Satisfied	%	Not satisfied	%
Condition of the building of lab.	42	59	30	41
Condition of furniture in the lab.	15	20	57	80
Condition of ventilation in the lab.	48	67	24	33
Condition of lighting.	51	71	21	29
Apparatus.	35	49	37	51
Storage for equipment.	18	25	54	75
Safety equipment ion lab.	09	12	63	88
Number of worktables.	21	29	51	71
Space within the tables.	45	63	27	37
Use of lab during teaching.	12	17	60	83
Work with each group of students.	09	12	63	88
Manage classes in lab.	12	16	60	84
Find support in form of allocation of periods in timetable.	09	13	63	87
Perform practicals in stipulated time period.	27	38	45	62

### Findings

Following findings were drawn from the study:

- All the 72 (100%) evaluated schools have laboratory building and electric supply as well.
- All the teachers are trained teachers have at least B.Ed degree however, only (8%) teachers have attended in-service training for the effective use of science labs.
- Fifty nine (59%) teachers were satisfied while, (41%) were not satisfied with the buildings of labs.
- Eighty (80%) teachers were not satisfied with lab furniture while, only (20%) were satisfied.

- Ventilation in (67 %) labs was satisfactory while, it was un-satisfactory in (33%) labs.
- In seventy one (71%) laboratories lighting was satisfactory while, it was un-satisfactory in only (29%) schools.
- In fifty one (51%) labs the apparatus was not satisfactory while, in (49%) labs it was satisfactory.
- Seventy five (75%) teachers were not satisfied to their storage rooms for apparatus while, only (25%) were satisfied.
- Eighty seven (87%) teachers were not satisfied to the safety equipments in their labs while, only (12%) were satisfied.
- In seventy (71%) schools teachers were not satisfied with number of worktables in their labs.
- In (63%) schools the teachers were satisfied to the space within tables to work while, (37%) were not satisfied.
- In (83%) schools the teachers were not satisfied to their use of lab during teaching the science subjects.

#### **Findings about the problems faced by teachers in conducting particles**

- In (88%) schools the teachers were not able to conduct practicals due to large enrollment in their classes, only (12%) were able to do so.
- In (84%) schools the teachers were not able to conduct practicals due to their small labs.
- In (87%) schools the teachers were not able to conduct practicals due to non-allocation of periods for practicals in time table.
- Sixty three (62%) teachers responded that they were not able to conduct practicals because most of the practicals are not possible to perform within stipulated time period.

#### **Conclusions**

From the findings the researcher concluded that all the selected schools had science labs. Electric supply is present in all these schools. All the teachers are trained teachers have at least B.Ed degree, however only 8% teachers have attended in-service training for the effective use of science labs.

Majority of the teachers were satisfied with condition of lab building, ventilation, and lighting. Majority of the teachers were not satisfied with condition of furniture, apparatus, storage rooms for equipment, safety equipments, no. of worktables, space within work tables, and use of lab during teaching science subjects.

Majority of teachers were not able to conduct practicals due to work load and shortage of time, large enrollment, non-allocation of periods for practicals in timetable, and shortage of time required for completion of most of the practicals.

### **Recommendations**

- Majority of the science teachers have reported that they feel difficulty in conducting practicals in the revised syllabus, it is therefore, recommended that whenever syllabi are revised teachers should be provide training for effective implementation of revised syllabus.
- Majority of the teachers have complained that the periods for science practicals are not allocated in the timetable therefore, the administration must allocate the periods for practicals in timetable just like the periods for theory.
- Majority of the teachers have complained the work load as a hurdle in conducting practicals it is therefore, recommended that the administration must keep in view the workload of science teachers so that they may be able to conduct practicals.
- Majority of the teachers have indicated the shortage of apparatus therefore, it is recommended that the Govt. must allocate the funds for schools to purchase the science apparatus just like the funds for maintenance & repairing (M&R) of buildings.

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