



RESEARCH PAPER

Role of Laboratories and Science Teaching Material in Science Teaching and Students Learning at Secondary Level in Public Schools

¹Iram Shahzadi ²Dr. Khawaja Hisham Ul Hassan ³Fariha Zahid

1. PhD Scholar, Department of Education, Superior University, QAED, Lahore, Punjab, Pakistan
2. Assistant Professor, Department of Education, Superior University, Lahore, Punjab, Pakistan
3. PhD Scholar, Department of Education, Superior University, QAED, Lahore, Punjab, Pakistan

***Corresponding Author:** Iramshahzadizulfiqar@gmail.com

ABSTRACT

The focus of this study is on the Role of laboratories in science teaching and students learning at secondary level in public schools. The science education is incomplete without the practical work and use of labs. This research study find out the utilization, availability and role of labs and science teaching material in science teaching and students learning at secondary level. It is a qualitative study and the purpose of this study is to explore the present difficulties and problems in science due to deficiencies of labs which affect both on science teaching and learning of students. Data is collected by interviews directed to science teachers. Interviews were semi structured. Researcher used open-ended questions. These interviews were recorded and transcribed by using thematic analysis, themes and subthemes are used for the analysis of data. The findings of this study showed that labs and science material is very essentials for the improvement of student learning and play significant role in the development of science education. Government should ensure the availability of science lab with enrich material in each school.

KEYWORDS Laboratories, Public Schools, Science Teaching Material, Secondary Level

Introduction

This is a scientific and technical era where we are living. Science learning, teaching and education is not possible without dedicated facilities comprising lab. Science education and teaching is unswervingly associated to labs and the experimental practical activities associated to science materials. Development in the science and science education and the apparatus and material used in science is one of the only deputies that can modify all kind of progresses. This perfection needs advanced raise in science education in students' abilities as well as in teaching methodologies at all levels. Students' consideration and the enactment towards the science subjects is decreasing day by day mostly at secondary levels in Pakistan. This was summarized by McIntosh who eminence that scientific knowledge has become a urge and compulsion for everyone and need to study and use of labs and science material for growth in daily life and travel toward success (Musah, & Umar, 2017).

The deficiency of science material for teaching and availability of laboratories in high schools effects on the effective teaching and efficient learning of student. This study will contribute to find out the role and availability of science teaching material and its effects on science teaching and learning of students at secondary level in public sector schools, to determine the utilization and role of labs in science teaching and students learning at secondary level in public sectors schools and to determine the hardships facing during teaching and learning due to lack of labs and material at secondary level.

Literature Review

Science education is a dynamic concern, which needs science apparatus for experiment and practical work in the laboratory to study science subjects. The science teaching and learning cannot be effective without testing and concrete work. Therefore,

Science laboratory plays an important role in the improvement and accomplishment of science goal. But in this day and age only some schools have apparatus in labs and laboratories too; in addition science not occupies a single unit. It is alienated into numerous branches and subjects as biology, physics and chemistry etc. Today's concentration in one or more than one branches of science need to realized for the scientific progress and enhancement. The requirements and the concentration of students in the field of science are also expanded. So it is very necessary to provide appropriate research laboratory accommodations and facilities to entirely branches of science not only to raise the improvement and progress of learners to absorb the subject but also improve the efficiency of teachers' their instructions as there is a basic need for the present exploration (Imogie, 2010).

The basic need of science is the use of science material in high schools as to perform activities and practical in classes as well in labs which improve the science education. (Abrahams, Reiss, & Sharpe, 2013; Hofstein, 1988; Koirala et al., 2019). Teaching materials, used as learning implements in every science subject in academies cannot be neglected. Science apparatus/materials expand students' skills and capabilities in understanding, attending, explaining, observing, intellectual, communication, and inscription with the collaboration of lyrics, codes and notions over and done with source of media and technology (Dunlosky et al., 2013).

Science materials accessibility and usage is very significant in schools for superior acknowledgement and consideration as the prospective to recognize and perceive the basic approaches and thoughts in our life is very vital and essential. It helps the learning of students and teaching of teachers to explore the nature, to inspect difficulties and observe miracles in technical and scientific deliberations (Achimugu, 2017; Olufunke, 2012; Joyce, & Showers, 2002). In the description of Chisman, there were little science practical and activities at primary and elementary level, whereas in the secondary schools most of the teachers have no equipment and the few science rooms and laboratories.in these schools the science teaching was based on rote learning (Chisman, 1984).

Quality science teaching and learning with the use of science apparatus and material consent the teachers to be combative, approachable, alert, helpful, amenable(e.g., appreciative the amazing performance), and malleable (e.g., students are prearranged to work their own personal way) are most for achieving the attentiveness and perfection. Operative use of laboratories and science teaching material provided momentous learning and understandings in the students (Akpan, 2006). In current times, the condition of science labs has existing no enhancement. Mostly schools have insufficient science apparatus, lack of proper established laboratories and the other necessary learning assets (Kennedy, 2009). Many laboratories which are operating in secondary schools do not overcome the marginal hubs obligatory for science education. The physical centers are not satisfied when the labs accommodations are insufficient and unsatisfactory (Okafor, 2000).

Material and Methods

The research was qualitative in nature, investigating the role of laboratories in teaching of science and students learning at secondary level in public schools in district Gujranwala. This research work is aimed at to describe the role, availability and use of science teaching material and laboratories and its effects on science teaching and learning of students. All the secondary public schools of district Gujranwala included in the Population of this study. In district Gujranwala total number of secondary public schools are 324, including 173 female and 151 male secondary schools. The researcher selected 10% sample of the total population and selected 32 secondary public schools out of 324, including 17 female schools and 15 male schools of district Gujranwala. From these schools researcher select 5 females and 5 males' teachers purposively for interview. Semi structured interviews were conducted for the collection of data from the selected teachers. The

recording with the permission of the teachers preceded. Following questions were asked in interviews.

- Q.1 What is the role of labs in student learning?
- Q.2 what kind of hurdle faced by science teachers and students in science Labs?
- Q.3 What is role of labs is in improves students' learning?
- Q.4 What kind of skills develops in student while using science Labs?
- Q.5 What is the status of science lab and material in your schools?

Results and Discussion

Thematic analysis was used to analyze the data after the transcription of recordings. This form of analysis is very popular among qualitative researchers. In this type the researcher looks for patterns present in the data to expose developing themes that develop into sets of analysis. This analysis produces the richest explanation of the information. On the base of interviews and then transcriptions the codes were made this helped in the managing and shaping the data on these codes the themes were easy to analyze. Following themes and subthemes were drawn from the collected data.

Science teachers Interview-based Themes and Thematic Analysis		
Sr. No.	Themes	Description
1	Role of labs in Students' Learning	a. science teaching b. students effective learning c. practical work in science
2	Hurdles faced in science Labs	a. no specific period b. congested area c. insufficient apparatus d. lack of funds/investment
3	Role in improving Learning	a. Students learning b. practical approach c. conceptual learning
4	Skills Development	a. psychomotor skill b. cognitive skills c. Activity base learning d. Self-confidence
5	Laboratories status	a. No separate lab b. Insufficient material

The detailed analysis and exploratory overview of the responses of the science teachers. A total of 10 themes emerged from the interviews, out of which 05 are used in this study.

Role of labs in Students' Learning

As the views of science teachers Laboratory play very important role in science teaching all the concept and base of science students depend on practical work one teachers answer that if there is no lab in the school there should no science subjects studied in this school. All science teachers answered that the Students 'effective learning is based on practical work and activities when the students learn by doing they can't forget anything. Many teachers stated that when the student are not familiar with apparatus and no interaction to labs the students can't do anything. All the science learning is based on

practical work. It was founded that Laboratory play very important role in science teaching all the concept and base of science students depend on practical work if there is no lab in the school there should no science subjects studied in this school the Students 'effective learning is based on practical work and activities when the students learn by doing they can't forget anything. If the student are not familiar with apparatus and no interaction to labs the students can't do anything. All the science learning is based on practical work.

Hurdles Faced in science Labs

The science teachers stated that the teachers and students facing many kind of hurdles, there is no specific period for the lab and practical work in time table the apparatus is also insufficient. one teacher answered that there is no lab in their school the little apparatus is kept in the boxes and not in the use of students and teachers. Majority science teachers answered that in many schools which are situated in cities have not enough space for laboratory work and the separate laboratory for subjects like biology chemistry physics and there is no room available where the student can perform their practical work. All the teachers agree on the statement that the apparatus present in public schools is insufficient. The student can't perform individually the teacher only show the apparatus in the class and don't let the student to perform due to insufficient apparatus and shortage of time period. Teachers stated that in many schools there is no fund available in schools to buy things for science if in case the fund is available the head teachers are more interested in the furnishing and decoration there is no investment on science and its materials. It was founded that the science teachers stated that the teachers and students facing many kind of hurdles, there is no specific period for the lab and practical work in time table the apparatus is also insufficient.

Role in Improving Learning

From the teacher point of view the use of labs improves science learning. Science students totally based on the practical work and use of labs two science teachers stated that if the science students don't do practical work while they studying science subjects then they do only route learning. All science teachers answered that the use of lab develop the practical approach in students when the students learn by doing the practical base work then this improve the practical skills in students Many teachers stated that the lab improve the concept of students this improvement reduce the route learning and students develop concept by using material. one teacher answered that the only concept making of students is ensured by the use of science material.

Skills Development

The science teachers stated that use of labs develop Psychomotor skills in students when they learn by doing. Teachers answered that the use of lab and practical work develop cognitive skills in students they think and utilize the things according to their mind and thoughts. Majority teachers answered that the use of labs develop activity base learning skills in students the students always learn by performing and doing different kind of science activities. Teachers stated that the use of labs develop self confidence in students.

Laboratories status

The teachers stated that there were no separate labs in schools with insufficient material to use. It was founded that the eminence of availability of science teaching material and laboratories at secondary level in public sectors school is not satisfactory. Many schools which are situated in cities have not enough space for laboratory work and the separate laboratory for subjects like biology, chemistry, and physics and there is no room available where the student can perform their practical work. In many schools there is no fund available in schools to buy things for science if in case the fund is available the head teachers

are more interested in the furnishing and decoration there is no investment on science and its materials. so the public secondary school facing much kind of hurdles to study science.

Conclusion

From the above study it is concluded that the dedicated laboratory, conduction of experiments and science material is mandatory to present in every secondary public school. It was observed from the above analyses that many schools has no functional science laboratory. no precise science lab facility, proper and optimal consumption of funds, insufficient material to facilitate teachers as well as students to form and practice science projects associated to their subjects, teachers 'and students should have free right of entry and use of science lab, the lab practical's and experiments increases students' academic performance, thus students should permit to use apparatus, science material unswervingly thus the use of science material and lab develops practical skills, psychomotor skills, cognitive skills in students

It is concluded that the isolated separate laboratory and science tools/material must be exist sufficiently so all students may perform lab related activities. This progress the science education and generate interest in students if the teachers use science teaching material during teaching this will boost the concentration and give awareness about academic deficiencies and problem. It also concluded that the sufficient and proper use of funds in school revolute the situation and atmosphere of the labs and science material in schools.

Recommendations

- i. It is endorsed that practical work and science activities should be comprised in science as a part of prescribed and official assessment procedure and take instant steps to well-equipped setup of science laboratories for the operational teaching and effective learning of science.
- ii. Principals should ensure appropriate utilization of funds, the proper place, proper period and proper laboratory material for science teachers and students.
- iii. The laboratory should properly organized and managed. There should be separate laboratories for each subject.

References

- Abrahams, I., Reiss, M. J., & Sharpe, R. M. (2013). The assessment of practical work in school science. *Studies in Science Education*, 49(2), 209-251.
- Achimugu, L. (2017). Availability and utilization of instructional materials for teaching Chemistry in senior secondary schools. *International Journal of Novel Research in Education and Learning*, 4(3), 33-43.
- Akpan, O. (2006). *Laboratory Facilities for Chemistry Teaching. Unpublished Seminar Paper. Nigeria: University of Calabar.*
- Chisman, D. G. (1984). Science Education and National Development. *Science Education*, 68(5), 563-69.
- Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest*, 14(1), 4-58.
- Imogie, A. I. (2010). A New Paradigm for Teacher Preparation in the 21st Century Nigeria. A Paper Presentation at *the Annual National Conference Organized by the Institute of Education, University of Nigeria, Nsukka.*
- Kennedy, E.U. (2009). Teachers utilization of Instructional resources in teaching Basic Electricity in rural and urban Technical colleges. *International Journal of scientific research in Education*. 2(2), 51-63.
- Okafor, P.N. (2000). Difficult concepts in physics as experienced by senior secondary students in Akwa Ibom State. *Journal of Research Information in Education*, 1(1), 114-121.