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# Analysis of the available Resources in Science Laboratories in High Schools of Quetta District

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## Abstract

*Science laboratories have an important role in imparting scientific education. Many topics of science cannot be understood through studding only theories. Only they can be understood through a procedure that can only be executed in laboratories. The objective of this study was to find out the available facilities in high school regarding LAB equipment and to determine available quantity of laboratory equipment in high schools. It is further to be determined how these resources/Equipment can play a important role in education of science. In order to fulfill the objective, the study drew upon primary and secondary material. The primary source data for the study was collected largely through the questionnaires from science teachers and students. Appropriate tools and techniques were applied for collecting necessary information for the study. All the related data or document was also revived. The relevant data covered both boys and girls high schools situated in Quetta. Total ten high schools were selected. The data was initially tabulated, compiled and processed. The data collected from high schools revealed that the scientific equipment and laboratory were only existed in high schools. The middle schools w lacked such facility. The experimental work was not considered important in middle schools. According to the results of this study, 99.5% high schools had laboratories. But half of the laboratories were not fully functioned. Lack of interest of teachers were seen in performing practices. No sufficient scientific equipment was seen. 60% respondents were not satisfied with sufficient quantity of equipment in laboratories of high schools. 43% respondents were not satisfied with the quality of scientific equipment. The quality of facilities can have great effect on quality of science education. It was concluded that the Baluchistan province is far behind in scientific education. The basic reason behind this situation is the weak education system. The schools were facing major problem of missing facilities regarding science equipment. It is recommended that the scientific equipment should be included in cluster program. Before procurement of equipment the required list of items should be*

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*demanded from headmasters or headmistress. Education department of Baluchistan should allocate sufficient budget for the procurement of laboratory equipment and this budget should be spent by head teachers.*

**Key Words**; Bureaucracy, Budapest Declaration, Constitutional Amendment, Curriculum, Fundamental Rights, Instructional Material, Procurement Process, Scientific Equipment, Secondary Schools.

## Introduction

This is an era of science and some scientific topic got importance regarding sustainable development of economy and space, quality of life, provision of health equipment, experiment to decrease chances of illness, sustainable environment, conservation of biodiversity, energy resources, agriculture production and water resources (UNESCO, 2010,p 2).

In Pakistan scientific education is compulsory in its education system at secondary level. Science subject is compulsory from primary to secondary level. A government has deputed thousands of science teachers to achieve the students learning outcome regarding science subject. The main purpose is to create awareness amongst the students about nature of science as well as process of science. Secondly to implement the scientific knowledge in their daily life.

In Pakistan the curriculum of the science wants to promote scientific education, the integration and violation between major science concepts and to cover the chemical, physical and earth science. The other objective is to develop the thinking of the student to demonstrate way and convert the capability to practice and also to apply science in daily life and for solving the problems.

At secondary level the science subject is mainly divided into three major parts. Mostly two types of methodology are introduced at this level. We can divide it into theory and practical. Curriculum of science consisted of physical, chemistry and life sciences. All three portions have practical work. The practical works are performed in laboratories. Here the students try to cover the main concept and law of physics. In chemistry they are in touch to cover the study of chemicals. In biology they learn about animals, plants and environment.

The laboratory has a great importance in secondary school. Its existence is mandatory to overcome the science subject. The laboratory is equipped with number of equipments to cover bench mark and standard of curriculum. The laboratory has a distinctive role. The methods of teaching or learning in

laboratory are inquiry method. The students learning outcomes can easily be achieved through inquiry method**.** ( Hofsten & U imcent. 2003, p 11).

For the last thirty years the laboratories have been given a central and distinctive role in scientific education. Educationists have suggested that student can get rich benefit from practical work. The world is facing a new era of reform in scientific education, teaching and new learning methodologies are introduced.

Science laboratory has an important role in conveying scientific education. Many topics of science cannot be understood through studding only theories. They can be understood through a procedure that can only be executed in laboratories. Practical works may be simple or complicated. It can be of short duration or long. In provincial secondary school laboratories practice regarding chemistry, biology and physics are performed. Use of different apparatus and drawing results can creates a deep interest in student and develop skills in them.

**Significance and Scope of Research**

Quetta city is capital of Balochistan province, literacy rate in Quetta city is higher than other districts. But the students are unable to achieve their student learning outcomes in science subjects. The scientific equipment directly linked with teaching methodologies and student learning outcomes. The present study may be useful for higher authorities of education department. The higher authorities can use the collected data and result for their future planning regarding the supply of equipment for secondary schools. The parents may know the importance of laboratory equipment and its impact on students learning outcomes. The non-governmental organizations can use these recommendation for their future project planning for schools in Quetta.

**Rational of The Study**

The importance of science can't be neglected. Balochistan has very low contribution in the progress of science. We have produced a less number of scientists. A thousand of students learn science subject per year, but a small proportion of students only know theoretical science. A very low budget is allocated for scientific or science subjects. Few school laboratories are facing low quantity of scientific equipments. The present study will provide actual position of the school laboratories regarding scientific equipment. The study will also provide actual picture of teachers and students interest in performing practical work.

## Statement of The Problem

The students learning outcomes(SLOs) are not achieved by the secondary school students regarding science subject in Quetta. Even students don't know the name of basic scientific equipment and equipments are not available in many secondary schools. Due to number of problems the dropout rate at secondary school level is increasing with the passage of time. Missing facilities in laboratory affects the teaching and leaving process among teachers and students.

## Justification

1. The study analyzed the availability of science laboratories in high school.
2. The study focused on the impact of available laboratory equipment in learning process of students at school level.
3. The findings of the study have identified problems and the identification of these problems may help the authorities to solve it.

## Objectives

1. To find out the available facilities in high school regarding LAB equipment.
2. The study determined available quantity of LAB equipment in high school.
3. It is further to be determined how these resources/Equipment can play a vital role in meaningful teaching and learning at school level.

## Research Questions

- How many schools have laboratories in its premises?
- What are the effects of laboratory equipment on learning of students?
- What is the role of education department for the provision of laboratory equipment?

## Limitations and Delimitations

This research study was limited to Boys and Girls public secondary schools of Quetta city.

## Literature Review

The role of education regarding social, economic standards of any country can't be ignored. Education has believe a strong effect on future policies of any nation. Those countries with strong and stable economic and political system based on strong education system. In this regard the millennium development goals (MDGs) are set by United Nation for all countries. The secondary goal

of MDG is to achieve maximum primary education for all children, it also focuses on increasing Net Primary Enrolment (NPE) and over all literacy rate. Vision 2030 was introduced by planning commission of Pakistan, its prime objective is to introduce quality education and enhance scientific education in society. Under vision 2030, one common curriculum and examination system was suggested. The third objective is to re-introduce the scientific vocational and technical training or skill at secondary level. For the promotion of science education engineering and technology universities are suggested to be established. (Pakistan social survey, 2012. p.11).

Scientific education has distinct role in education system. A person who is scientifically literate can easily interpret and criticize. A student can use his or her scientific skills to develop their knowledge. The students can perform small experiments to develop or enhance their knowledge. By providing scientific knowledge people can get benefit personally, create interest in work and can make informed decision. A scientific knowledge equip the students for future. It empowered them to explore the world. (Gaffney, 2005. p. 22).

There is a "science driven change" in 21th century. It allowing science education more necessary than ever. The science education has a paramount importance for any country. Many countries are providing science education to its people and have achieved their goals but many developing countries still face difficulties to find knowledgeable professionals in the field of science. Now the world has changed to technology bases economy to cover this gab the nation needs science students or people. (Kalolo, 2014. p.12).

Scientific education deals with transfer of knowledge among those who are not a member of scientific community due to its importance a number of developed countries have achieved their goals and showed progress in technologies but still developing countries are far behind in this sector the science subject consist of chemistry, physics and biology and in there subject the net enrollment rate is low. (Kola , 2013. p 12).

Science development is recognized by developed by developing countries. Through science and technology a nation may be able to increase its productivity and fulfill its daily routine needs. In new developing countries it has been observed that science is responsible for half of their productivity. In many countries the people are losing their interest in science the main reasons are irrelevant curriculum, difficult teaching methods and lack of untrained teachers. There is little opportunities in science oriented jobs. (Anderson, 2006. p 22).

In laboratory an environment create where the students are encouraged to raise questions to develop their critical thinking, student work individually and in

small or large groups, they share their knowledge with each other, lead to social interaction. Students are also to encourage to gain technical skills to achieve the educational out comes. In laboratory conceptual understanding regarding subject achieves, the student develop scientific reasoning skill and can better understand scientific laws and natural science. (Almorth, 2015. p 2).

Equipment and chemicals are kept in school laboratory. Services, chemical and equipment make a laboratory a danger place regarding safety and health. It needs qualified staff and props management and use scientific equipment the educationalist suggest that only daily use equipment should be kept in laboratory. Other equipment should store separately. the educationist have suggested values and regulations for laboratory doors, space, lifts security, pupil ,benches, perimeter benching, demonstration bench , presentation area, display area, adjustable height bench, work surface, cup boards, equipment trolleys and also suggested proper management for bags and coats , ready use equipment, Gas taps, Gas pipes, electrical sockets, electrical circuits and water supply. (Gratnall report, 2010. p 33).

**Methodology**

The research study is based on the survey based quantitative plus qualitative research method. The study drew upon primary and secondary material. The primary source data for the study was collected largely through the questionnaires from teachers and students. Appropriate tools and techniques was applied for collecting necessary information for the study. All the related data or document was also revived. The field work of the study started after the acceptance of research proposal. The relevant data covered both boys and girls high school situated in Quetta. Total ten high schools were selected. The data was initially tabulated, compiled and processed.

**Research Design**

This research was mainly quantitative cum qualitative in its nature. It focused on intensive study from only one district. The data focused on the quantity of equipment in laboratory.

**Population and Sample**

The Boys and Girls of public secondary schools in Quetta district was total population. The sample was randomly selected and five boys and five girls secondary schools were selected as a sample.

Total number of Boys Secondary Schools, 05

Total number of Girls Secondary Schools, 05

Total number of schools, 10

**Tools of The Study**

- Documents and Reports study
- Questionnaires
- Focused Group Discussion

**Respondants**

214 Secondary school students (107 male, 107 female) mainly of class ninth and tenth and

10 science teachers from ten secondary schools.

**Name Of Selected Schools And Number Of Students (Respondants)**

| Name of selected schools | Number of students |
|---|---|
| GGHS- Satellite Town | 27 |
| GGHS- Railway Colony | 20 |
| GGHS- Quetta Cant | 20 |
| GGHS- Irrigation Colony | 20 |
| GGHS- Kawari Road | 20 |
| GBHS- Akbar Bughti, Quetta | 20 |
| GBHS- Special | 27 |
| GBHS- Haji Ghaibi Road | 20 |
| GBHS- Comprehensive Quetta | 20 |
| GBHS- Staff College | 20 |
| Total | 214 |

**Statistical Analysis**

The data was collected and analyzed through SPSS. The results were showed in percentage, mean and median

**Data Analysis And Results**

Table 4.1 shows existence of Science Laboratory in Schools

| | | Frequency | Percent |
|---|---|---|---|
| Valid | YES | 213 | 99.5 |
| Missing | System | 1 | .5 |
| Total | | 214 | 100.0 |

Total number of respondents were 214, 213 respondents replied in YES with percentage 99.5,1 did not reply with percentage .5 , Mean of this question was 1,Standard Deviation of this question was 0

Table 4.2 shows Equipment for Biology in Laboratory

| | | Frequency | Percent |
|---|---|---|---|
| Valid | YES | 85 | 39.7 |
| | NO | 128 | 59.8 |
| | Total | 213 | 99.5 |
| Missing | System | 1 | .5 |
| Total | | 214 | 100.0 |

Total number of respondents were 214, 85 respondents replied in YES with percentage 39.7

128 respondents replied in NO with percentage 59.8 , 1 did not replied with percentage .5 , Mean of this question was 1.6, Standard Deviation was 0.491

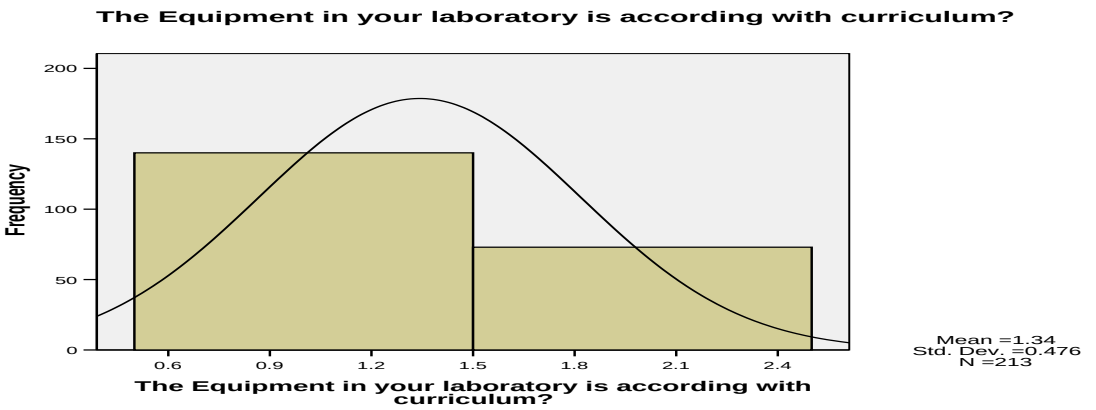


Figure 4.1 shows Equipment in Laboratory is according with environment

Total number of respondents were 214, 140 respondents replied in YES with percentage 65.4, 73 respondents replied in NO with percentage 34.1 , 1 did not replied with percentage .5 , Mean of this question was 1.6, Standard Deviation was 0.491

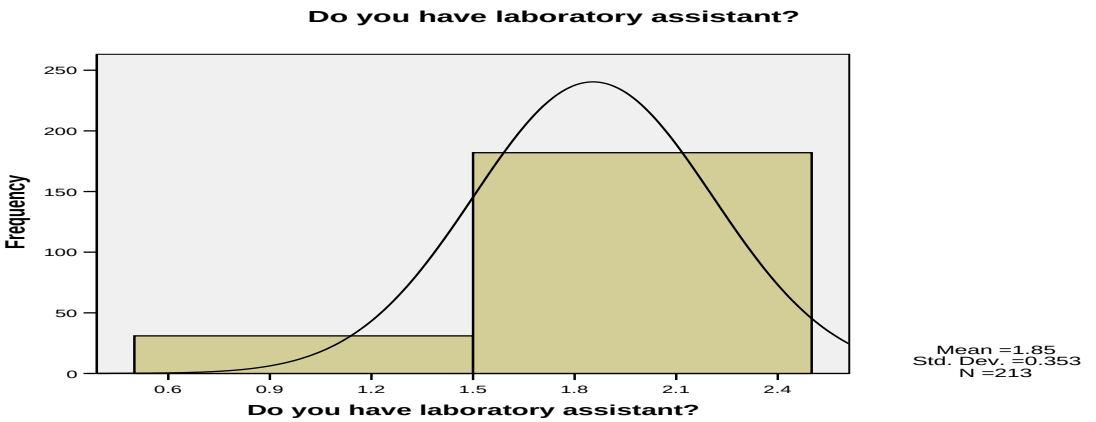


Figure 4.2 Shows Existence of Laboratory Assistance

Total number of respondents were 214, 31 respondents replied in YES with percentage 14.5, 182 respondents replied in NO with percentage 85.0, 1 did not replied with percentage .5 , Mean of this question was 1.85, Standard Deviation was 0.353

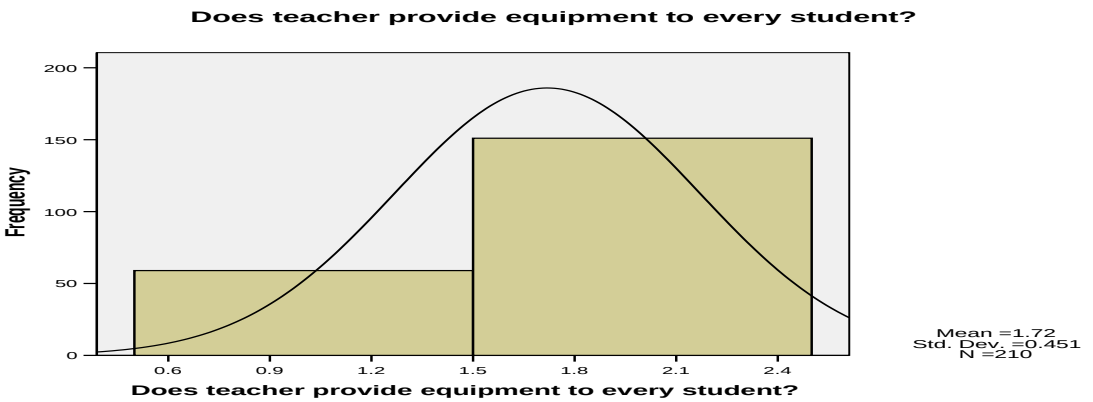


Figure 4.3 Shows provision of equipment by the teacher

Total number of respondents were 214, 59 respondents replied in YES with percentage 27.6, 182 respondents replied in NO with percentage 70.6, 4 did not replied with percentage 1.9 ,Mean of this question was 1.72, Standard Deviation was 0.451


Figure 4.8 Shows hand washing facility laboratory

Total number of respondents were 214, 25 respondents replied in YES with percentage 11.7, 186 respondents replied in NO with percentage 86.9, 3 did not replied with percentage 1.4 , Mean of this question was 1.88, Standard Deviation was 0.324 .

**Discussion**

According to Hathaway (2005), Pakistan spends less than two percent of its Growth domestic Product (GDP) on education. Literacy rate in Pakistan is

under fifty percent. Education system of Pakistan faces problems of low investment by federal and provincial governments, lack of professional teaching trainings, politics involvement in education system and weak institution capacities. The results of research conducted by Hathaway also shows inadequate laboratory facilities in science laboratory of schools.

Study conducted by Saeed and Wein (2011), most of the public schools in Punjab face shortage of laboratory equipments and other physical resources. The condition of science laboratories were not satisfactory. The science equipment were not properly displayed. Some expired chemical were also found and not used by the teachers and students.

No sufficient scientific equipment was seen. 60% respondents were not satisfied with sufficient quantity of equipment in laboratories of high schools. Equipment is an essential element of laboratories. The teaching or practicing in laboratory requires equipment and facilities. The standard and level of equipment were varying school to school. The curriculum stresses on the utilization and maintenance of scientific equipment. It is the prime responsibility of government of Balochistan (GOB) education department and PSF (Pakistan Science foundation) to provide basic science facilities in secondary schools. The quantity of equipment can be independent variable, which can be the quality of scientific education. Here in secondary schools of Quetta city, the cost and supply of equipment was a major problem. The headmistress and the headmaster of the secondary schools have limited powers, even he or she can't purchase single item for their school. Education department supplied scientific equipment once in three or four years. It has been observed that they could not consider need and required quantity of missing facilities. Curriculum emphasized the simple and well-designed equipment for secondary schools. 57% respondents were not satisfied from chemistry equipment and same numbers were not satisfied with physics equipment.

## Conclusion

It is concluded that the Baluchistan province is far behind in scientific education. The basic reason behind this situation is the weak education system in our schools. The schools faces the major problem of missing facilities regarding scientific education.

A number of science teachers were untrained. The curriculum 2006 is introduced in whole province but the teacher posted in Quetta city is not aware about curriculum 2006. The government of Balochistan (GOB) has

not provided PDT (Professional Development Training) to their science teachers. The funds generated for professional training were misappropriated the bureaucracy. There was no check and balance regarding the proper use of funds. For the last two year the funds are distributed through cluster program. It was a fruit full program as compared to other program but still loopholes were observed in this cluster program. No recommendation and required items were demanded before the distribution of resources. Even in cluster program the placement authorities were not concerned to distribute scientific equipment among the secondary schools.

According to this research it is also concluded that scientific education is important for every student and it has great impact on national and provincial development. Incapable bureaucracy untrained teachers and corruption are the major problem to affect this development. Science cannot be learned easily without performing practical. It has been observed that those schools which have given importance to practical work, the student of that schools achieved their $SLO_{s.}$ Where the student interact with each other in learning process. They obtained good marks in exams. Most of the student cannot achieve their SLO due to shortage of equipment in LABS. The shortage of equipment has badly affected the teaching and learning process. The students learning outcome are not achieved through practical work. The limited use to resources have impact on learning environment.

**Recommendations**

1. It is recommended that the scientific equipment should be included in cluster program. Before procurement of equipment the required list of items should be demanded from headmaster or headmistress so that need based strategy could be chalked out.
2. Education department of Baluchistan should specify a high budget for the procurement of laboratory equipment and this budget should be spent by head teachers with the consultant.
3. There should be no role of bureaucracy regarding the procurement of LAB equipment.
4. More practical work should be included at secondary level and these practical should cover the majority topics of curriculum.
5. A training regarding the management of equipment performing of practical work and laboratory management should be given to every science teacher on annual basis.
6. More new and latest equipment should be introduced in scientific LABS of secondary schools.

7. Most of the science classes should be taken in laboratories this will help the students to observe the equipment to develop their skill by using equipment.
8. It should be the duty of science teachers to enhance their skills and to share their practical skills with other science teachers. They should encourage constructivism approach of teaching in their school.
9. Before construction of any LAB the Government should design a LAB with large space and fully equipment with basic needs.
10. A separate cluster of teachers or group of teachers should be formed to evaluate or monitor the laboratory equipment in all secondary schools.

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