

## A Study of Impact of Laboratory on Academic Performance of 9th Class Students in Science Subject

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### ABSTRACT

The laboratory has been given a central and distinctive role in science education, and science educators have suggested that rich benefits in learning accrue from using laboratory activities. The present study was carried out to assess the impact of laboratory on academic performance of 9th class students of Jammu city in science subject in private schools of Jammu city. In the present study, the data was based on the sample of 250 students of 9th grade level, 125 student's males and 125 females from five Private schools of Jammu city. The Incidental sampling technique was employed for this purpose. The academic performance of students in science subject was identified on the basis of records maintained by the schools. Questionnaire related to the laboratory usage for learning science subject was prepared specifically by the investigator for students. The results of the present study revealed that the female students used more of laboratory as compared to the male students. The study also showed that the students of age group 12 years used more laboratories for learning science subject as compared to that of 13 and 14 years students in Private schools. The results revealed that some students were facing problems in usage of laboratory. Overall it was found that there was a positive impact of laboratory usage on students' science achievement. The results have wider implications for the stakeholders.

**Keywords:** *Academic Performance; Science Laboratory; Science Education, Science Achievement.*

Science education is the field concerned with sharing science content and process with individuals not traditionally considered part of the scientific community. The learners may be children, college students, or adults within the general public; the field of science education includes work in science content, science process (the scientific method), some social science, and some teaching pedagogy. Good schools combine classroom teaching with laboratory experiments to ensure that their students grasp each and every concept thoroughly. It is also believed that laboratory teaching and experiments that are being conducted there

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help encourage deep understanding in children. Children are able to retain the knowledge for longer when they see the experiments being performed in front of their eyes.

Science laboratory equipment allows students to interact directly with the data gathered. It is also found that school science laboratory equipment and supplies make teaching and learning easy both for the teachers, as well as for the students. There are several scientific theories and concepts that are difficult to explain directly from the books. Anatomy models, physics science kits, and chemistry science kits for instance make it easy to understand the otherwise complex theories of science. There are different scales which assess classroom environment. Each scale has been classified according to Moos's (1974) scheme for classifying human environments. The dimensions of human environments include relationships, personal development, and system maintenance/change (Moos, 1987). Fraser (1998) later refined Moos's (1974) work to make it more appropriate, initially to describe classroom learning environments and then science learning environments.

Laboratory teaching assumes that first-hand experience in observation and manipulation of the materials of science is superior to other methods of developing understanding and appreciation. Laboratory training is also frequently used to develop skills necessary for more advanced study or research. One major difference between elementary and middle or high schools are the nature of the classroom. Most elementary school classes are "self-contained," and a single teacher is responsible for teaching all or most of the academic subjects to a single group of students. Thus, science is usually taught in the regular classroom, as opposed to specialized science laboratories, as is usually the case in middle and high schools; however, it is not unheard of for elementary schools to have separate laboratory facilities for science (Beihle, Motz, & West, 1999; Fehlig, 1996; Fox, 1994; Harbeck, 1985; Vorsino, 1992). Forty percent of schools nationwide reported that their facilities could not meet the functional requirements of laboratory science. More recent data from the 2000 National Survey of Science and Mathematics Education suggests that along with lack of content preparation, inadequate facilities and equipment and lack of money to purchase consumable supplies are barriers to the effective and equitable teaching of science (Weiss et al., 2002). Jones and Edmunds (2006) explored three different models for elementary science instruction, two of which included a school science laboratory. In the "Resource Model," the laboratory housed teacher and student resource books, as well as manipulative, kits, and consumable materials, all of which were available for classroom teachers' use. Education in the largest sense is an act or experience that has a formative effect on the mind, character of physical ability of an individual, in its technical sense it is the process by which society deliberately transmit its accumulated knowledge, skills and value from one generation to another. Samba and Eriba (2011)

### **REVIEW OF RELATED STUDY**

Omiko (2007) in stating the functions of the laboratory in science teaching observed that the use of the laboratory develops interest, good attitudes and values in students.

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Luketic & Dolan (2014) The laboratory learning environment in which chemistry teaching and learning occur is therefore likely to have a major influence on students' learning outcomes and impact positively on enhancement of chemistry teaching and learning.

Luketic & Dolan Omiko (2015) and Ufondu (2009) were of the same opinion where they observed that laboratory teaching is sometimes used in conjunction with large lecture courses so that students may acquire technical skills and apply concepts and theories presented in the lecture.

### ***Objectives***

- To assess the academic performance of 9th class students in science subject.
- To study the impact of Laboratory usage on the academic performance of the students of 9th class in science subject.
- To identify the problems faced by the students of 9th class in using the Laboratory.

### ***Sample***

The sample covered the 250 students of 9th class using Laboratory from private schools of Jammu city. The sample was chosen carefully so as to be the representative of the population. The sample involved 250 students studying in 9th class from five private schools of Jammu city. The sample included 125 males and 125 females of 9th class who used the Laboratory in their classes for learning science as a subject.

### ***Scoring Of The Tools***

After administration of tool, scoring is required. Each statement was scaled on 2 point scale viz. Yes and No. The scoring key for the scale Yes and No was followed as 1 and 0 respectively.

### ***Statistical Techniques Employed***

Cumulative percent frequency, t- test, Mean, Standard deviation, One way Anova Correlation for impact, Split half reliability coefficient.

## **ANALYSIS OF DATA AND INTERPRETATION OF RESULTS**

In order to study and ascertain the attitude of students of 9th class towards Laboratory of private schools the following conclusion has been reached in respect of the objectives.

***Table 1 , Gender difference of students with reference to the Laboratory usage***

<b>Gender</b>	<b>Mean</b>	<b>Mean Difference</b>	<b>Standard Deviation</b>	<b>t-value</b>	<b>Sig.</b>
Male	15.6080	-.80000	2.51735	3.065*	0.002
Female	16.4080	-.80000	1.47613		

*\*Significant at  $p < 0.05$ , Males:  $n=125$  ; Females:  $n=125$*

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**Table 1** reveals that the mean score of males on Laboratory usage was (15.60) and the mean score of females on Laboratory usage was (16.40). The standard deviation of males was (2.52) and the standard deviation of females was (1.48). The result of t- test indicates that significant difference was found between males and females in the usage of Laboratory at  $p < 0.05$  level. It shows that females used more of Laboratory for learning as compared to that of males.

**Table 2, Mean scores of students on the basis of age with reference to the Laboratory usage**

Age	N	Mean	Standard deviation
12	48	16.5000	1.70106
13	145	15.9517	2.16452
14	57	15.7368	2.19192
Total	250	16.0080	2.09799

**Table 2** shows the mean score of students of age group of 12 years was (16.50), the mean score of students of age group of 13 years was (15.95) and that of age group of 14 years was (15.73) on Laboratory usage. The result reveals that the students of age group of 12 years used the Laboratory more as compared to the students of age group of 13 and 14 years.

**Table 3, Significance difference between different age groups on Laboratory usage (One way-Anova)**

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	16.269	2	8.135	1.861	0.158
Within Groups	1079.715	247	4.371		
Total	1095.984	249			

**Table 3** reveals that statistically there is no significant difference between students on the basis of different age groups in their Laboratory usage. This suggests that all the students of different age groups get an equal opportunity to use the Laboratory in the same way.

**Table 4, Science Achievement scores of 9th class students**

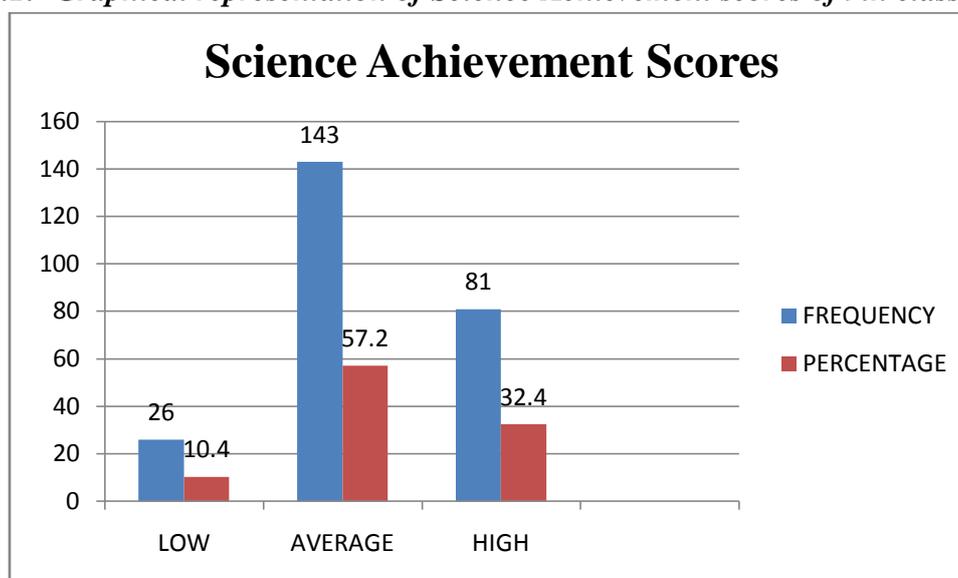
	Frequency	Percent	Valid Percent	Cumulative Percent
<= 59 LOW	26	10.4	10.4	10.4
60-79 AVERAGE	143	57.2	57.2	67.6
80+ HIGH	81	32.4	32.4	100.0
Total	250	100.0	100.0	

**Table 4** shows that 10.4% students scored low scores, 57.2% students scored average scores and 32.4% students scored high scores in science subject. Result reveals that the students of 9th class showed variations in science scores and most of the students fall under average level

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of scores. The result shows that the overall achievement of 9th class students in science subject was found to be average.

**Figure 4.1:- Graphical representation of Science Achievement scores of 9th class students**



**Table 4.5.1, Table showing Laboratory usage and science achievement**

	Mean	Standard Deviation	N
SCIENCE ACHIEVEMENT	72.41	11.497	250
SUMQ	16.0080	2.09799	250

The **Table 5** reveals the mean value of science achievement was (72.41), standard deviation was (11.49) and mean value of Laboratory usage was (16.00) whereby standard deviation was (2.09).

## FINDINGS OF THE PRESENT STUDY

### Research Objective 1

**To assess the academic performance of 9th class students in science subject.**

#### 1.1 GENDER DIFFERENCE OF THE STUDENTS WITH REFERENCE TO LABORATORY USAGE

It is evident from the results that females used more of Laboratory for learning as compared to that of males. The results of the present study may be well supported with previous conducted study related to the area of research which indicated that most females tend to use laboratory ore positively while males tend to show indifferent attitude towards usage of laboratory. M. Gail Jone, Jack Wheatley (1990). The results of this study may also be co-related with the previous conducted research by Rosser (1993) sustained that focus was shown ore by female where laboratory methods work more effectively.

## **1.2 AGE WISE DIFFERENCES AMONG STUDENTS WITH REFERENCE TO LABORATORY USAGE**

The result reveals the differences between the students of 9th class with reference to their Laboratory usage on the basis of age. It is evident from the results that the students of age group of 12 years use more of Laboratory as compared to that of 13 and 14 years students. It may be due to the reason that the students of 12 years are more excited in using Laboratory. The results of the present study can be co-related with previous similar study conducted by Stranger and Gridina (1999) in which it was concluded that children aged from 12 to 17 were occupied with Laboratories for about 1 hour and 37 minutes daily.

## **1.3 SCIENCE ACHIEVEMENT OF 9TH CLASS STUDENTS**

As per the responses from the students on Laboratory usage and the achievement scores of students, it has been found that the learning through Laboratory usage effects the achievement of students. The results reveal that the performance of students in science subject is neither high nor low it has been found average. The results of this study may be co-related with the previous conducted research. Bharadwaj & Pal (2011) sustained that teaching methods work effectively mainly if they suit learners’.

### **Research Objective 2**

**To study the impact of Laboratory usage on the academic performance of the students of 9th class in science subject.**

## **2.1 IMPACT OF LABORATORY USAGE ON STUDENTS’ SCIENCE ACHIEVEMENT**

It has been found that the correlation between Laboratory usage and science achievement scores of students was found to be significant at  $p < 0.05$  level. The results revealed that there was a close relationship between Laboratory usage and science achievement. The result suggested that there was positive impact of Laboratory usage on science achievement scores of students. Aladejana and Aderibigbe (2007) .All the reports emphasized that the integration of practical and theory components in a learning environment promotes favourable academic performance. Other research results that corroborated this findings are Fraser, Onwuakpa and Akpan 2000; Kamaruddin, Zainal and Aminuddin, 2009 and Akpan, 2012 .

### **Research Objective 3**

**To identify the problems faced by the students of 9th class in using the Laboratory.**

## **3.1 PROBLEMS FACED BY THE 9TH CLASS STUDENTS IN USING LABORATORY**

- 1) It was found that students had limited access to Laboratory laboratories.
- 2) It was observed that in some schools there was over crowding of students in the Laboratory laboratories and consequently students could not get the equal opportunity to use the Laboratory.
- 3) It was found that there was scarcity of open science laboratories in some schools.
- 4) It was observed that teachers and students had limited knowledge about the usage of Laboratories.

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- 5) Some students showed hesitation in using and handling the Laboratory equipment, so they needed help of Laboratory experts in the laboratory.

From the above findings, it has been found that in spite of Laboratory usage the students of 9<sup>th</sup> class were facing some problems in using Laboratory in their learning process.

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