

# Impact of Science Teaching Methodologies on Students' Performance, in Sindh Province of Pakistan: A Case Study of Secondary Schools in Khairpur Mir's District

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Students' attention towards learning science subjects appears to be reducing at all levels of education in developing countries, like Pakistan. This problem is influenced by science teaching methodologies and learning processes. The exploration of factors influencing teaching and learning provides suitable information for enhancing the learning of science subjects. Main objective of this study is to discover science teaching and learning methodology in secondary schools of District Khairpur Mir's. The questionnaire was prepared for students to explore the aspects that motivate students towards studying. The questionnaire identifies teaching methodologies with students' performance in response of their results. A sample of 82 students (both male and female) was selected from different schools of District Khairpur Mir's. The age of the participants ranged between 15-18 years (with mean of 15.56 years). Their educational levels were students of grade ninth and tenth and their socio-economic status ranged from lower-middle to upper-middle income groups. The data obtained were tabulated and analyzed by percentage values.

*Keywords:* students, teaching methodology, performance

## Introduction

Science is a major and an important subject at secondary school level. Science (physics, chemistry, and biology) subjects play a vital role in the field of education. Through studying the subject of science, students develop their' observation, experiment, critical thinking, problem solving techniques and it develops practical work strategies. Students will learn new theories by emphasizing the skills of influencing the physical world; they will inculcate rational from information, because the students study in an innovative way and are introduced to unique ideas and to think over and observe them.

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The principle reason for instructing to any level of training is to acquire a vital change in the study (Baviskar, Hartle, & Whitney, 2009). To construct basic techniques for learning correspondence, instructors must apply appropriate instructional strategies that mostly suit to adjust targets. In the anticipated age, educator focused techniques to convey data to learners in respect to focused approaches. Till today, inquiries regarding the productivity of showing plans on understudy learning have constantly brought extensive consideration up in the topical field of instructive research.

Furthermore, investigation on teaching and learning continually endeavors towards observing the area to which unusual teaching methods improve development in student knowledge. Moderately unfortunate educational performance via the well-liked students is basically related to request of unsuccessful teaching methods by teachers to transfer knowledge to listener (Chandrasegaran, Treagust, & Mocerino, 2008).

Significant review on the capability of showing techniques demonstrates that the benefit of education is as often as reflected by the accomplishments of learners. Education is a practice that includes required changes for learners to get clear results. Chandrasegaran et al. (2008) keep up that instructors require mindful arrangement with the expectation of catching acknowledgment of the span of difficulty of the ideas to be secured.

Science subject shows techniques containing the qualities and strategies utilized for instructing to be actualized by educators to achieve learning objectives. These teaching methodologies' problems are solved decently on topics' to be educated and imparted by the way of the learner. In current situation teachers only use lecture method and other teaching methods are not used in the class. In lecture methods students were passive and teachers were active (Hake, 2007).

### **Research Objective**

To find out the impact of science teaching methodologies on students' performance.

### **Research Question**

Do science teaching methodologies have impact on students' performance?

### **Research Hypothesis**

There is no significant impact of science teaching methodologies on students' performance.

### **Scope of the Study**

This research study is conducted to determine the position of teaching of science, students learning, and students' performance at secondary and comprehensive higher secondary schools of District Khairpur Mir's, Province of Sindh. The methods used to teach science will be investigated. This research suggests solutions to the existing science teaching learning and students achievement related problems.

## **Literature Review**

Science suggests the information got or received from observation and experiment. Science subject is major subject in our education. Science subject provides to think critically and relate the ideas theoretical with practical. It may be dreadfully creative if we have a propensity to utilize our skills to acquire get liking from it.

### **Science Subject and Its Importance**

Science subject provides academic information to scholars, and furthermore it uses another kind of knowledge of the investigational skills (Kumar, 2004). Science subject may be an artistic intellectual activity resulting in joining ideas of men in natural surroundings (Buck, Bretz, & Towns, 2008).

The object of instruction of science into secondary schools is to transformation the students thinking of understanding. Furthermore, it is necessary that information of physical sciences is required additional learning of science as well as equipment's. It must to facilitate to accrue investigation of all abilities; create the power to suppose and make use of information to resolve the physical matters.

In learning science on early stage of teaching, the scholars face several difficulties during perceptive logical thoughts, laws and theory within science classrooms and labs. In the view of Wood (1991), "Science subject must be concerning the exercise of scientific processes than the exercise of scientific facts". Consistent with Hackling (2005), this age of science is understood because of the age of students.

Sungur and Tekkaya (2006) said that the break of dawn of time plus sudden increase information help in the teaching of science toward each student. Moreover, investigation of several usual college people can show a little less (a lot but 11%) following a few varieties of science teaching. Subsequently, a few plan in the direction of setting up science learning toward students that can interact into more learning of the science subject. Science subject linked with skill will build an important involvement in the direction of raising our common place of lively hood.

### **Science Teaching in Pakistan**

Brew (2003) said that the science subject plays a vital role in the financial development of several social orders for peoples. Science subject has found important in the curriculum of every country round the world. Especially, last few decades, science teaching is instructed on totally different levels and that it has been continuously growing the last few decades.

The trend of science teaching in different countries of the world is different and it does not completely target the development of science teaching towards of understanding in students. As an example, the current form of science ideas given to students in the developed countries are actually placing additional stress on students' understanding in relation with the "nature of science" which consists of good quality goals (AAAS, 1993; NRC, 2006).

However, this side of science teaching has not yet achieved the levels in different developing countries like Islamic Republic of Pakistan. When the scientist Iqbal was student in sixties, science students in the associated colleges got the definition of science as "variety of facts; body of information & an organized body of knowledge" (Iqbal, 2008).

Robinson and Nurrenburn (1996) conducted a case study that science teaching has different kinds of concerns for the learners. By suggestion students develop the understanding that there is no area linked with remarkable discoveries; which is regarding the absolute and vital phenomenon.

Many studies offer different methods through which teachers prepare their lessons regarding the need of science subject (Gallagher, 1991). Inquiry interested in the character of school science teaching is to frame teacher values with understanding of the character of science plus knowledge base.

As we explore to science, teachers reply in the direction of text book in a manner to throw light in the direction of science teaching. Teachers are often satisfied about however important and influential teachers they are; as a teacher they influence student's brain. The whole thing teachers say shows teacher beliefs inside. Many studies expose the manner science is instructed in the schoolroom that totally depends on teachers' personal beliefs.

## Research Methodology

### Research Design

The present study is conducted by survey method. Quantitative model of research is used for collecting data in pure sciences such as physics, chemistry, and biology. Through this survey method irrelevant variables are eliminated. In this research male as well as female students are to examine of science teaching methodologies and students performance.

This study was undertaken to examine the different effects of teaching methodologies of science subject on students' performance, and to find out the effective teaching methodologies of science subjects.

### Population

There are 10 High Schools and two Government Comprehensive Higher Secondary Schools for boys and girls in District Khairpur Mir's, Sindh, Pakistan. Students (male and female) of High Schools of District Khairpur Mir's Sindh (Pakistan) were the population of this survey study.

### Sampling Design

Convenience sampling method was used in sampling design. Out of 10 High Schools, four Government Secondary Schools were selected and out of two Government Comprehensive Higher Secondary School for boys and girls, one Government Comprehensive Higher Secondary School was selected for sampling.

From all these schools, 82 students of ninth and tenth class randomly were selected.

### Research Instrument

In this research study questionnaire tool was used for collecting data. Student questionnaire was used as instrument for the collection of data, and student questionnaire adapted from Likert Scale.

### Data Collection and Data Analysis

Data were collected through questionnaire. Questionnaires were distributed among the male and female students of ninth and tenth class. Data were analyzed through percentage and SPSS. From this data it is examined the impact of science teaching methodologies on students' performance.

## Analysis of the Questionnaire

### Reliability of the Questionnaire

Table 1

*Case Processing Summary*

		N	%
Cases	Valid	82	100.0
	Excluded	0	0.0
	Total	82	100.0

*Note.* a. List wise deletion based on all variables in the procedure.

Table 2

*Reliability Statistics*

Cronbach's Alpha	N of items
0.989	14

**Demographic Information of the Questionnaire**

Table 3

*Gender*

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Male	46	66.09	65.0	65.0
	Female	36	43.9	35.0	100.0
	Total	82	100.0	100.0	
Missing	System	0	0		
Total		82	100.0		

**Item-Wise Analysis of the Questionnaire**

Table 4

*Item Analysis*

Items	Total	SA	%	A	%	U	%	DA	%	SDA	%
Science is a primarily formal and practical way of representing the real world.	82	70	85.47	16	9.95	2	2.4	1	1.20	2	2.4
It is good to use teaching Aids material in science class.	82	61	74.48	13	15.14	2	2.4	2	2.4	4	4.77
It is important for science teachers to give students directions for doing effective science subject learning.	82	61	74.48	16	19.09	2	2.4	2	2.4	1	1.20
To link of one topic with other is essential for understanding achievement of the students.	82	49	59.12	19	23.44	4	4.87	6	7.31	4	4.87
Science teachers facilitate you to work together for understanding difficult topics.	82	53	64.63	22	26.82	2	2.4	3	3.6	2	2.4
Science teachers use different ways to stimulate students' science skills, for learning outcome.	82	61	74.27	16	19.09	2	2.4	2	2.4	1	1.20
Science teachers adapt different ways to teaching learning strategies and techniques for student's performance.	82	61	74.27	15	17.21	2	2.4	2	2.4	2	2.4
For science subject achievement it is necessary for students to accompany practical work for achievement in science subject.	82	55	67.07	21	25.60	2	2.4	2	2.4	2	2.4
The science teachers provide help when there are difficulties in understanding a topic or task.	82	62	75.31	8	9.75	8	9.75	2	2.4	2	2.4
Science teachers manage a class in discussion, demonstration, activity, project base method for student's performance.	82	52	63.41	19	23.17	5	6.09	4	4.87	2	2.4
Science teachers present clear and simple examples to clarify difficult ideas.	82	51	62.65	21	25.60	4	4.87	4	4.87	2	2.4
Science teachers use alternate explanations when students do not understand a topic.	82	53	64.10	13	15.85	3	3.6	1	1.20	1	1.20
Teachers have knowledge and skills of teaching of science subject.	82	70	85.47	7	8.53	3	3.6	1	1.20	1	1.20
The teachers establish and maintain eye contact with the class.	82	70	85.47	7	8.53	1	1.20	1	1.20	3	3.6

Notes. Strongly Agree = SA, Agree = A, Undecided = U, Disagree = DA, Strongly Disagree = SDA.

### Analysis of Research Hypothesis

#### Null Hypothesis

There is no significant impact of science teaching methodologies on students' performance.

Table 5

#### ANOVA

Model	Sum of squares	Df	Mean square	F	Sig.
Regression	81.926	1	81.926	2,459.807	0.000
Residual	4.929	148	0.033		
Total	86.855	149			

Notes. a. Dependent Variable: Students' Performance, b. Predictors: (Constant), Science Teaching Methodologies.

On the basis ANOVA results, the overall model is significant (F-Statistics = 2,459.807 and Sig. < 0.05).

Table 6

#### Coefficients

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. error	Beta		
(Constant)	0.675	0.105		6.440	0.000
Students performance	1.146	0.023	0.971	49.596	0.000

Note. a. Dependent Variable: Students' Performance.

Here, null hypothesis is rejecting because t-value is greater than 2 and Sig. is less than 0.05. In simple words, there is impact of science teaching methodologies on students' performance.

$$Y = \alpha + \beta_1 X_1 + \epsilon$$

$$Y = \alpha + \beta_1(\text{STM}) + \epsilon$$

$$Y = 0.675 + 0.23(\text{STM}) + \epsilon$$

If there is 1% change in (STM), there will be 0.23% change in students' performance.

### Discussion

The statistical results are interesting regarding teaching science subjects at the schools. With response to the Statement 1, 70% respondents are strongly agreed that science is a primarily formal and practical way of representing the real world and 61% are strongly agreed that it is good to use teaching Aids material in science class. In response to the Statement 3, 61% respondents are strongly agreed and 16% agree that it is important for science teachers to give students directions for doing effective science subject learning. In response to the Statement 4 "to link of one topic with other is essential for understanding achievement of the students", it shows that 49% are strongly agreed and 19% agree that a good number of teachers use different techniques for linking one topic to other topic. In response to the Statement 5, 53% are strongly agreed and 22% are agreed that science teachers facilitate you to work together for understanding difficult topics. In response to the Statement 6, 61% of the teachers assign students homework while 6.2% are undecided and 2% disagree and 1% strongly disagree that it shows that a good number of science teachers use different ways to stimulate students' science skills, for learning outcome. Statement 7 shows that majority of science teachers adapt different ways to teaching learning strategies and techniques for student's performance. Statement 8 indicates that 21% teachers

are agreed and 55% are strongly agreed that for science subject achievement it is necessary for students to accompany practical work for achievement in science subject, while 2% are disagreed and 2% are strongly disagreed. Statement 9 indicates that majority of the science teacher provide help when there are difficulties in understanding a topic or task. Statement 10 results indicate science teachers manage a class in discussion, demonstration, activity, project base method for student's performance. Statement 11 results indicate the science teachers present clear and simple examples to clarify difficult ideas. In Statement 12, 53% students strongly agree and 13% agree in favor that the science teachers use alternate explanations when students do not understand a topic. In Statements 13 and 14, 70% students are strongly agreed that teachers have subject knowledge and maintain eye contact during the class.

### **Conclusion**

It has been observed that majority of the students answered in Strongly Agree and Agree; these answers show that science is primarily a formal and practical way of representing the real world. It has also been shown in the results of this study that it is good to use teaching Aids/ material in science class. Majority of the students of schools of Khairpur Mir's favor in linking of one topic with other topic and it is essential for achievement of the students. Majority of the students of schools of Khairpur Mir's emphasize on teachers to facilitate students and work together for understanding difficult topics, and it helps students achieve good grades. Students suggest science teachers use different ways to stimulate students' science skills, for students learning outcome and also science teachers adapt different ways to teaching learning strategies and techniques for student's achievement. Majority of the students of schools of Khairpur Mir's emphasized on practical work with theory for better understanding. Majority of students replied in the favor of linkage between theory and practical work. It is good to know that science teachers help students when students have difficulties in understanding a topic, as when students understand topic then they achieved good grades. Results also indicate that usage of alternate teaching methodologies like discussion method, activity based method, project based method, and demonstration method may help in the better understanding of topic for students. Results of Item 11 clearly declare that science teachers present clear and simple examples to clarify difficult ideas when students do not understand a difficult topic. It is necessary for science teacher to use alternate explanations when students do not understand a topic. For the science subject achievement, it is necessary that the teachers have knowledge and skills of teaching the subject. Results also indicate that for understanding topics, science teachers establish and maintain eye contact with the class and recognize who learns and who does not learn.

Above conclusion tells us that if teacher wants a student to achieve good grades in science subject, then he/she will perform well and with full dedication, incorporating various teaching techniques in the lessons.

### **Recommendations**

On the basis of discussion and conclusion, concrete recommendations would be given.

(1) Government should arrange the training programs for developing better teaching methodologies for performance of students.

(2) The 21st century is known as the century of technological advancements. Government should allocate sufficient funds for establishment of computer and equipment laboratories into High and Government Comprehensive Higher Secondary School to meet the challenges of the new world.

(3) Students should be provided conducive environment at High and Government Comprehensive Higher Secondary School than students should be encouraged to learn new skills for performance.

(4) Government/head of institute should link the institute with relevant industry and teachers should arrange different workshop/ study trips for students, so that they can focus on academic performance.

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