Teaching of Science Through Interactive Methodology and its Impact on Achievement of the Students

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Abstract
Nations emphasize science education as a key factor for making progress in different fields. In teaching methodology, it is very important to pay attention to innovation as countries usually have a map of progress due to new techniques in science education, which are followed by these countries. It is a universal fact that science plays a vital role in the progression of different fields of life. Education of science in accordance with the modern needs of society is very important for increasing literacy rate and empowering future generations in different fields. It is high time to progress in science education, so as to make it challenging to cope with the requirements of the coming times. This study explores the teaching of science through interactive methodologies and its impact on the achievements of the students. The main objective of the study were to assess the impact of teaching science through interactive methodology on students achievement at elementary school level. An experimental study was conducted to understand the effectiveness of both teaching methodology, that is, traditional and interactive methods. The finding of the experimental test showed that students who are taught through interactive methods performed better in the post-test and their average marks increased after the experimental test. The students who are taught by the same traditional method, their pre-test marks and post average marks remained the same. After descriptive analysis the data and bar graph representation, the test score concludes that null hypothesis is rejected.
Keywords: Teaching of science, Interactive Methodology, Student Achievement

OBJECTIVE OF THE STUDY

- To assess the impacts of teaching science through interactive methodology on student achievement at elementary school level

INTRODUCTION

The present study was based on the assumption that conceptual understanding, interest, and motivation of students' in the science subject is high if interactive teaching methodology is adopted in a class by the teachers. The help of the students in understanding science is the basic important purpose of science education (Bettentt, 2003). The world is rapidly changing and the teaching of science plays a super role, which helps students learn to accept and adjust to social changes. Science teaching may involve several aims, as it has immense coherence and connection with other subjects, and supports students in understanding and learning other subjects. Simbiyan **(2015)** states that the basic purpose of science teaching is to bestow knowledge and information about the world we live in. If one aspires to lead and live as a useful member in the current community, it is the necessary for all to know some facts of natural occurrence (living & non-living), law and properties of matter, and the application of knowledge of science and the scientific principles that we find by chance in our daily life (Dr. R Simbiyan, 2015). The students learn when they are provided the opportunity. They learn

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through the active inquiry and collaboration with peers and adults, and promote learning. The context of learning in this vision, is humanistic through creative and imaginative encounters with teachers (Jack Hassard and Michael Dias, 2015). In short, science education is changing the society. Since many centuries, the students have been interested in science education as it has a lasting characteristic of science education and impacts the lives of the students. To add, parents have always been anxious about student's interest in the selection of science subjects. (Bettentt, 2003). In Dewey's view, science education is a practical trend. The basic role of science education is to provide facilities to the students. It makes the students able to understand the subject matter, and side by side, it makes the students understand the modern approaches of science. Understanding of science plays an important role for the students and students use these real scientific skills to solve everyday problems. The scientific skills help in the progress of any nation, which develops the social and economic state of a country by bringing drastic changes at the grass-root level. Acknowledging its significances and liveliness, the science subjects and its syllabus have always on the top of any country (Javed, 2012). The teaching of science plays a vital role at the secondary level because students in this period are in a growing age and whatever will have been taught to them gets engraved in their minds. The teachers should provide the learners with learning opportunities and have them indicate the achievements using diverse procedures and teaching styles (Dr Bhaskara Rao, 2003). Since many centuries, the students have been interested in science education as it has a lasting characteristic of science education and impacts the lives of the students. To add, parents have always been anxious about student's interest in the selection of science subjects. (Bettentt, 2003). Recently, throughout the world researchers are being done on the teaching of science education and methods of teaching. Vijaya and Lakshmi have very rightly stated that teaching is both an art and science and good and capable teachers will always find ways and means to improve their teaching techniques(Vijaya, Lakshmi, 2004). Interactive teaching means maintaining a close relation between teachers and students, in which teachers communicate with the students and work together in the classroom to keep them engaged. The teaching of science becomes more interesting through interaction, which stimulates the students to work and learn. The interactive teaching strategies support students throughout their learning period. The interactive styles of teachers stimulate and motivate students and they start discussing with each other on the related topic. When teachers use the teaching styles, students have a chance for sharing and getting knowledge. Teaching styles increases the involvement of students (Master, 2009). Interactive techniques are more effective and beneficial when teaching the students science. These techniques include brainstorming, group work, activity, and think-pair-share, question and answer session and many more. Interactive techniques and their use are very effective in the classroom for optimum learning. When teachers use interactive techniques that make the students engaged and active and also lead to a higher level of understanding (Angelo & Cross, 2005). The importance of science education in today's world is overwhelming, and therefore the world must gear itself to provide the required training in scientific skills to meet this growing challenge. Dobbin (1999) asserts that those people who choose science as careers, in fact, have a great status. They become a symbol of respect and honour not only for their family members, but also for their communities and the society at large. They should describe how science education can profit humanity, and to what expanse

it might be significant for the society(Javed, 2012). If the child is not learning the way you are teaching, then must teach in the way the child learns (Dunn, 1975). Time and research findings demand to teach the students science subjects for better understanding of other subjects as well. This is a technological era, and it is the age of science, and providing science education is the basic need of the students. It is therefore, commonly assumed that in many countries, science subjects are being taught according to new methods using updated models.

STATEMENT OF THE PROBLEM

Science is a process of seeking data in a practical way based on facts and figures, about an essential experience. The practical work is in the field of science remains on the top because students learn more by practical work rather than passive learning. The current study in this regard was designed to investigate the teaching of science through the interactive methodology and its impact on the achievement of the students at the elementary schools in the Larkana region.

RESEARCH DESIGN

The experimental study was an effort to know the effectiveness of both teaching methods; that is, traditional and interactive methods. The problem is already clear about this scope and the variable relationship. This experimental research study suggested a specific answer through which the teaching methodology in the science subject could affect the success of the students. The purpose of this study was to investigate the teaching of science through interactive methodology and its impacts on the achievement of the students in the subject of science. The students of 7th class were selected to participate in the research and random sampling was used to selection. Two teachers were selected from same school, both teachers had equal teaching experience and qualifications and were teaching science subject at the same school. They were selected for teaching the experimental group. One teacher for experimental group was trained voluntarily and she was given training for 15 days for interactive methodology to make her ready to teach science to the experimental group. Contrary to this, the second teacher was given instructions that she had to teach the control group using the existing method. Data were collected through experimental study. The research sought to gather information regarding teaching through interactive methodology, the creativity of students on a broader spectrum through interactive methodology, encouraging students through interactive methodology, and motivating students in group discussions.

REVIEW OF RELATED LITERATURE

Creswell (2005) suggests that there is a way to study literature review material which is developed through various researches to give a direction to the present study. The study deals with the literature related to the 'Teaching of Science through Interactive Methodology and its Impact on the Achievement of the Students'. This study aims to explore and investigate the current science reading materials and to demonstrate the philosophy in schools and to plan an intuitive model for teaching science applicable at grade 7 level. The study of science is more focused on various institutions around the world. The word science is derived from the Latin word 'Scientia'or 'scienceia' which means knowledge. Science is a form of learning developed

through a non-stop application method involving people who engage in logical endeavors (Mumtaz, 2008). In Pakistan, the study of science is considered as a traditional concept of study, which is mostly dependent on teachers. In other words, the trend of teaching in Pakistan is still teacher-centered, with the teacher taking the central stage and the students become passive listeners. In view of the developing centers of science and technology in Pakistan, it is a huge loss, and this is indeed a high alert for Pakistan to focus on science teaching and this aspect should be particularly highlighted. Britannica states that science is a study of the things determined by a hidden form to which the general acquiesce may be obtained and it joins to further enhance the determinations, which is part of individuals, who can pick it up in a brilliant way and follow the directions initiated under the decision. This way of search is neither defected nor contented (Mumtaz, 2008).

The study area for this research study was located in the upper part of Sindh, which includes three districts: Jacobabad, Shikarpur and Larkana. The researcher's interest developed in the Jacobabad district. The study of science is not valued in these areas. The teaching and learning process for science follows the same way as the teachers were taught during their student days, which is obsolete and even minimal learning outcomes and objectives are not achieved. The way of the training framework for most parts of these districts is commenced in numerous ways and many issues emerge at the time of training as the trainers are unfortunately untrained and barely have any idea of the existing problems. One of these is identified with the use of strategies for teaching science at the level of grade 7. The need which is confined here is to bring improvement in the education of science at the secondary schools in Jacobabad, Shikarpur and Larkana Districts in order to enter the race with the developing countries, which is moving at a fast pace. Three districts belonging to the province of Sindh were selected for the study:

1. District Jacobabad
2. District Shikarpur
3. District Larkana

Configuration of these districts is as under:

Jacobabad has three Talukas

Shikarpur has four Talukas

Larkana has four Talukas

It is well known that the study of nature has remained a prime and prominent inquiry for the human beings and it is considered as the wonders of the world. If the students of science could experience the matter of things around them, they can be well aware of the solutions to the problems faced by them in daily life. They can make different tools for the solution of the prime problems, which are mostly faced by them. An issue in the current era has been to detect and observe the environment either biologically or physically, and that could be meaningful to interact with the nature in relation to the patterns and techniques using authentic tools (Taber & Apkan, 2017). It has come under different views that with the span of time to improve the instructing and observing processes and to encourage students, different training strategies and systems have persistently been prevented as well as presented. In one such part of time, educators have always changed and improved a variety of traditional techniques, unanimously declaring the ancient general techniques of teachers not to be successful and favorable for the students (Dewey, 2004). Student's interest in various fields of science education is a key component in achieving the desired goal of

understanding and grasping the nature of science. The awareness of the nature of science, and its scientific methods can lead the oppressor to understand, and critically examine a significant component of the modern field of the literal age (Venville & Dawson, 2001). Education is a process of positive change in behaviors, attitudes, manners and the way of expressing ideas, while science education is concerned with the study of nature, which leads to the discovery of its various mysteries and effects on the daily life is formed. It usually focuses on the teaching and learning process. The greatest impact of science education is to attract students to new inventions and different theories in terms of scientific research (Bettentt, 2003). The guidelines for science teaching give desires to the advancement of comprehension for the students throughout the whole course of learning. The conservative subjects incorporated into the gauges are physical, alive, and existing in science instructional materials and can help students to understand the phenomenon of science gradually (Mujibul Hassan, 2005). The selection of science as a subject or discipline of specialization should purely depend on the interest of the learners and it should be the choice of the learners to decide which subject suits them and which subject can increase the level of interest in learning. This could increase the chances of achievement of the students from the first day. This interest of students can bring a prominent change in student`s behavior, attitude, and etiquette as well as their reflection on science education (Carin, 1989). It is a sign of pride that when an individual chooses science subjects, he not only grasps a better future, but also takes care of the concerns of the society. The perspectives not only play an important role, but the whole world benefits from the notions. It also benefits humanity and is a symbol of respect (Ralph E.Martin, Jr. Sexton Colleen , Wangner Kay, 2004). It is a sign of pride that when an individual chooses science subjects, he not only grasps a better future, but also takes care of the concerns of the society. The perspectives not only play an important role, but the whole world benefits from the notions. It also benefits humanity and is a symbol of respect (Ralph E.Martin, Jr. Sexton Colleen , Wangner Kay, 2004). The public should be well aware of the benefits of science so that they could reap the harvest. The public communication should be turned towards science and its inventions so that nature is understood in a better way. For this particular cause, it is necessary for the public to remain engaged in such a way that it may affect their daily life. A scientist is a person who better knows about the study of nature and can lead to result-oriented conclusions. They can lead the students according to their intentions for the betterment of humanity. However, their intentions are always effective and efficient for every individual of the society, who puts great interest in the field of science (Marincola, 2006). Hone (2008) affirms that the education of science helps the individuals to detect different harmful diseases and their solution is also found, so that it may not have an adverse effect on human health and thus may protect the humanity(Javed, 2012). Not only in Pakistan, but throughout the world, science education plays a key role in the mental development and a vital role in advancing the learning about the study of nature. It enhances the skills of dealing with different situations. In this regard, different tools are used to redress the ways of investigation and inquiry, which students handle different situations and tend to find an easier way to solve the issues of learning of science (Taber & Apkan, 2017). The objectives of science education were elaborated to encompass the gaps in learning of science education. It was decided to familiarize the students of science education with the Quranic acquisition, and science education may be used as a vehicle to contribute to general education. It

was also made to explain the possibilities and limitations of science to students, and the impact of science on society, so as to prepare them for the technological age.
(Retrieved from http://yayoi.senri.ed.jp/ois/curriculum/science_aims_objs.htm)
Our general public today needs youngsters who are adaptable, imaginative, and proactive; who can take care of issues, take quick decisions, think fundamentally, impart thoughts viably and work proficiently in the groups and gatherings. The knowing about learning is never again enough to prevail in the undeniably unpredictable, liquid, and quickly developing world in which we live. To upgrade long-lasting learning and potential achievements, it is generally acknowledged that youngsters need to have chances to create individual capacities and successful deduction aptitude as a feature of their balanced training and this must be finished by giving them chances of self-realization where they have the opportunity to choose what to realize, how to learn and when to learn (Yakovlevaa, 2014). The consideration of the researchers throughout the world is revolving around teaching of science through interactive models, which is observed as one of the most effective tools used for better teaching and learning. In this current era, the advanced countries have been using different models to enhance science teaching. Many writers have elaborated on the teaching models to encourage the teaching and learning process and to make instruction more successful and result oriented (Grady venville and vaille Dawson, 2001b). A learning model is a plan that can be used to guide curriculum development (long-term curriculum), design teaching materials and instruction in the classroom and other settings (Joyce Bruce R. , Weil Marsha, 2014). Bull and Bull (2005) advocate that the usage of project-based internet connection can enhance the teaching and learning in this era of education from which learners can get a message of awareness as well as learning updated teaching techniques. These can be observed and applied to boost the morale of the learners and the instructors interest in teaching and learning, thereby creating an interactive learning environment (Sessoms, 2008). Science teaching is based on the lecture method which is found to be boring, dull and difficult method of teaching and most of the students are found to be inactive and passive during the session (Mujibul Hassan, 2005). Nonetheless, even today, many developing countries use updated models and methods for teaching and learning.

PROBLEM FORMULATION

"Do the students who are taught through interactive teaching methodology have a significant understanding of science subjects than those who are taught through traditional methods?"

METHODOLOGY

There were twenty-four (24) weeks of meetings to conduct the experimental research. The first test was already done and the last one was done in 24 weeks. The steps were as follows:

a. Selecting samples from students using a simple sampling method, by which class A (35 students) was assigned to the experimental group and for which a science subject teacher, who was pre guided and trained for teaching the experimental group. Class B (35 students) was assigned to control group and another teacher from the school was also given the task for this and that teacher was also guided and trained for teaching in the traditional way as the teacher take their routine class.

b. Pre-tests were taken from both the experimental and control groups
c. The students of experimental group were taught through an interactive teaching method. In terms of content and chapters, the syllabus and outline of the teaching material in both groups was the same.
d. After 24 weeks of experiment procedure, post-experiment was done with both the experimenter and the control group.

INSTRUMENTS

For pre-test and post-test, the researcher used the same test from the students of class 7.

a. The test was made from the syllabus of the class 7 science subject.
b. The test was parallel to the objective of the course.
c. Students were given instructions when taking the test.
d. The test was validated by experts.

DATA COLLECTION

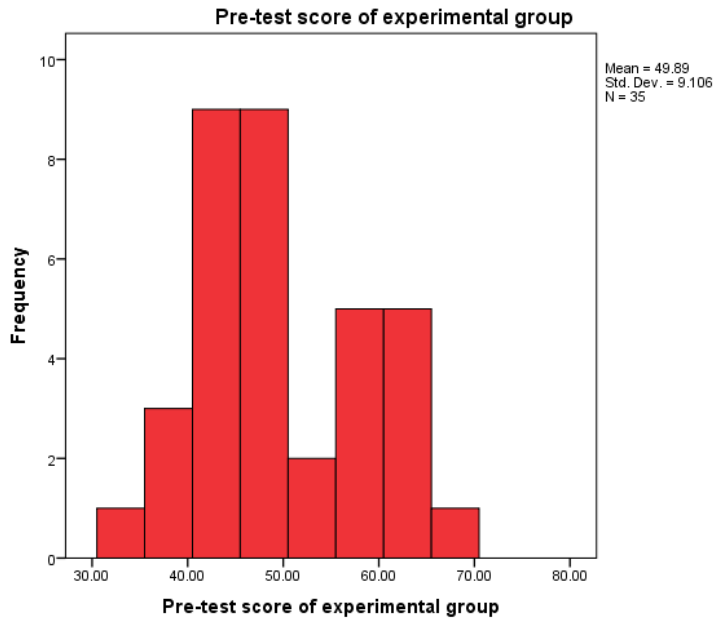
The data were students' test scores of pre-test and post-tests from both experimental and control groups.

DATA ANALYSIS AND PRESENTATION

The purpose of the data analysis was to test the research hypothesis. After analyzing the data obtained from the pre-test, it was turned into a null hypothesis. The presentation of the data is an imperative part of analyzing the data. To highlight the outcomes and to make the data or marks more. the researcher presented the final data analysis using the pre-test and post results and descriptive statistics for the experimental and control group.

Table 4.116: Data analyses and presentations

MAXIMUM MARKS = 100	Descriptive Statistics								
	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Result of Pre-test (Experimental group)	35	36.00	33.00	69.00	1746.00	49.8857	1.53927	9.10647	82.928
Result of Pre-test (Control group)	35	25.00	40.00	65.00	1764.00	50.4000	1.02670	6.07405	36.894
Result of Post Test (Experimental Group)	35	38.00	51.00	89.00	2620.00	74.8571	1.26368	7.47601	55.891
Result of Posttest (Control group)	35	28.00	36.00	64.00	1783.00	50.9429	1.06821	6.31964	39.938


Pre-test score of experimental group
Mean = 49.89
Std. Dev. = 9.106
N = 35
Frequency
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2
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6
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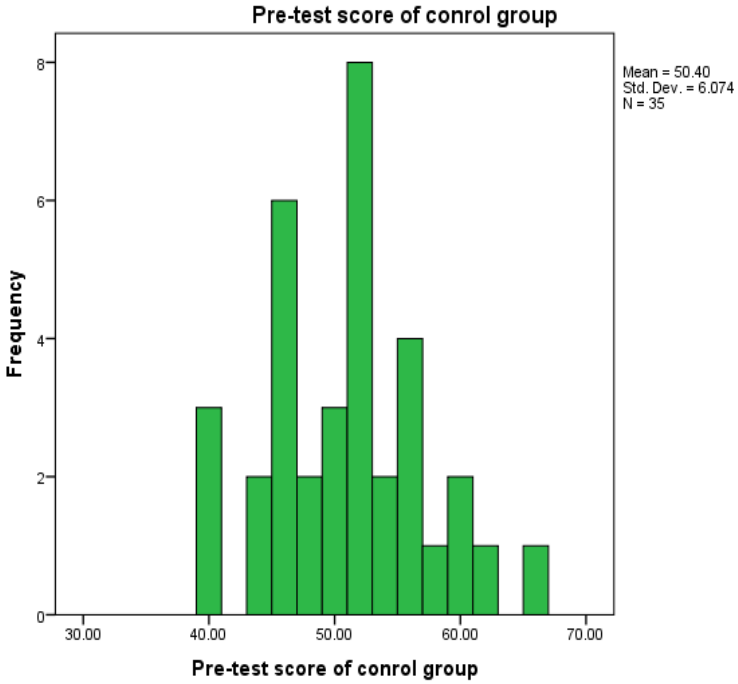
60.00
70.00
80.00
Pre-test score of experimental group


Pre-test score of conrol group
Mean = 50.40
Std. Dev. = 6.074
N = 35
Frequency
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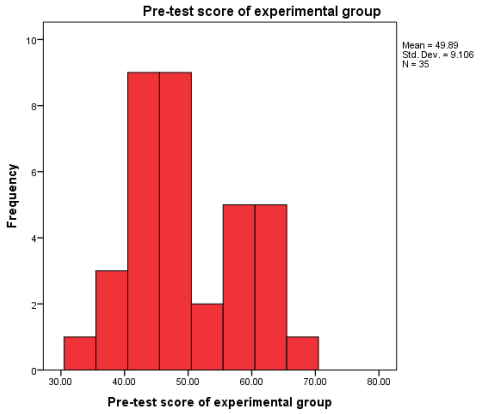
Pre-test score of conrol group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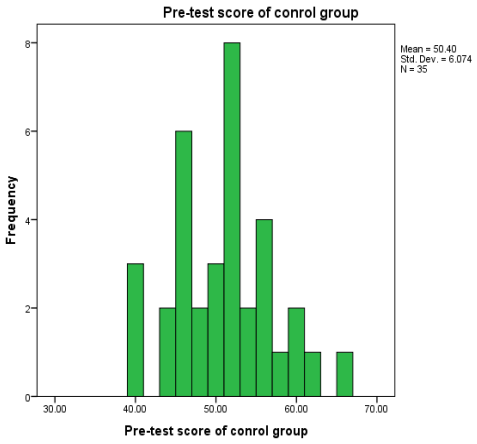
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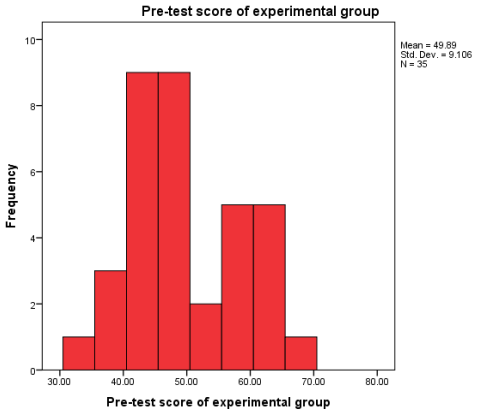
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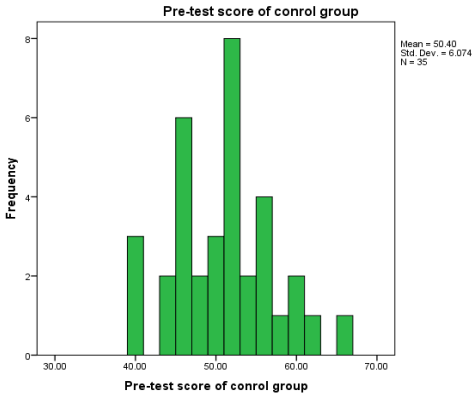
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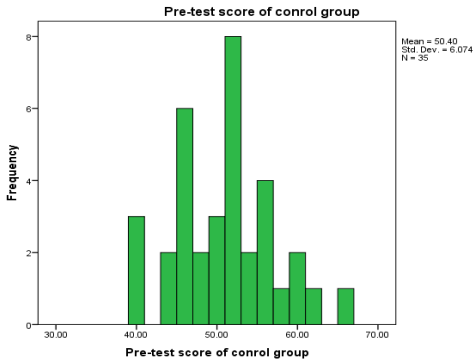
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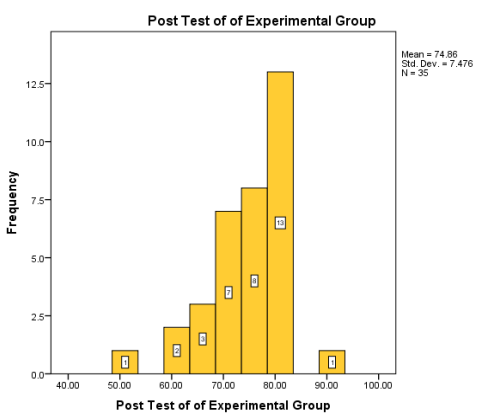

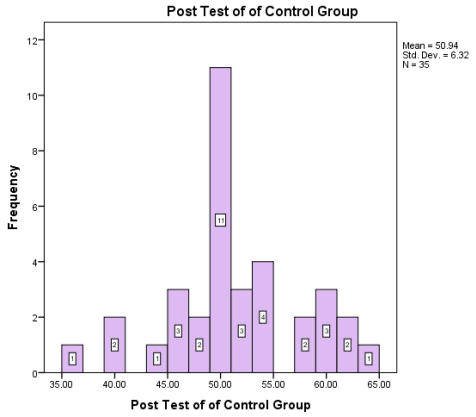

Based on the above descriptive analysis of the data and bar graph representation of Grade 7 students' first test and post-test scores, it is concluded that the application of interactive teaching methods has a positive effect on the success of students in science subjects. Students who are taught through interactive teaching method perform better after the test and their average marks increase. Students who were taught using the traditional method scored average marks and the results were the same. After analyzing the data, the test score concludes that null hypothesis is rejected.

FINDINGS AND DISCUSSION

The results of the experimental study revealed that the students who were taught by the interactive method achieved a good score in the post-test. The students who were taught by the traditional method achieved low score and their result was the same, in pre-test and post-test of science subject. Based on the quantitative data findings of the study, the statistical results exposed that interactive teaching methods can influence the achievement of students in the subject of science. The effective teaching of science subjects also emphasizes the importance of continuous assessment of students' understanding and providing detailed performance feedback in terms of improving students' understanding and learning (Mollianne G. Logerwell Master, 2009). This study will be helpful for students who learn and understand the nature of science through interactive methodology. This underlying study may help to promote quality education for science teaching at the middle school level. The findings might add to the existing knowledge about the present teaching methods of science, and the different stakeholders might support to improve the quality of science education. This study will be helpful for teachers who teach science at middle schools in the district of Jacobabad, Shikarpur, and Larkana in the upper Sindh areas of Pakistan. Achieving tasks will not be easy because of the numerous difficulties and complexities involved, but a good start is to equip our school system to make them science-friendly.

RECOMMENDATIONS

The following recommendations are made for teaching science through interactive teaching method in the subject of science:

- It is suggested to post the science teachers for the teaching of science.
- It is suggested that science rooms should be supported by teaching A/V aids.

- A better environment must be provided to the learner, so that they effectively communicate with different ideas, opinions, and share with colleagues.
- Overfull classrooms put students at the threat of lower achievement proportion and lead them to disruptive behavior. To overcome these problems and preserve close contact between the teachers and the taught, the strength of class should not go beyond 30 students.
- Laboratories with necessary facilities should be provided for students so that they do practical work.
- It is recommended to organize annual science fair programs and reward hard-working teachers and students.
- The syllabus has to be designed in a way that creates, advanced thinking, analytical skills, and curiosity to learn among the students.
- It is recommended that refresher courses should be conducted for science teachers to motivate them towards work and preserve their interest in the teaching profession.

CONCLUSIONS

Based on the review of literature, data analysis and findings of the study, the following conclusions are drawn. The experimental study showed the effectiveness of interactive methods as a compared traditional method at the seventh grade level. Teachers' strategies were affecting the conceptual understanding of students in the science subject. The teaching through interactive methodology was uplifting the creativity of students vertically as well as horizontally and the participation of students was directly proportional to teacher and student interaction in different activities. The teachers' encouragement through the interactive methods was stimulating students for group discussion. Through the interactive teaching method, the teacher was the main focal person. This method of teaching has already yielded positive effects on students' learning achievement in developed countries like the USA, UK, China, Australia, Canada, and more.

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