Development of Scientific Knowledge and Science Comprehension through Activities at the Elementary Level Schools in Pakistan

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Abstract *The main aim of this study was to observe the effect of activity on science comprehension skills among 8th graders. Relevant literature revealed that science comprehension skills can be increased through activity. Quasi-Experimental (QE) design had been used. Threats to internal/external validity were undertaken properly. Two groups were selected to collect data to achieve the above-stated aim. The test was developed as per the table of specifications. It was piloted. Then it was administered as a pretest before intervention and posttest after the intervention. The data were analyzed using t-statistics. The activity is recommended for teaching science comprehension skills.*

Key Words: Activity-Based Science Teaching, Concept Building, Memorization

Introduction

Activity-based teaching-learning is a technique in which students are occupied in acquiring knowledge (Prince, 2004). Panko *et al.*, (2007) define an activity-based learning process in which student s are not passive learners but they actively take part in the learning activities. McGrath (2011, p.23) explained the activity-based teaching as a method in which learners process his knowledge by doing and critically reflecting in comparison to traditional teaching approaches in which the learner is only restricted to knowing. Each learner can learn through application and direct participation in activities and in this way, they develop their thinking about the world. They make sense of things from their perspective. The activity-based method of teaching helps them to build up their perception. According to Rillero, 1994 "A child best learns to swim by getting into water; likewise, a child best learns science by science."

Literature Review

Ewers (2002) said that learning science makes the students logical thinkers who organize the learned concepts in a way that they can utilize these in dealing with real life problems. So, teaching science in a way that makes learners be able to get benefit from it and utilize it for the services of mankind is the most crucial part of the curriculum and education system (Safdar, 2007). And it is the one person who can make it possible and that is the teacher. The role of teachers in teaching science cannot be restricted to as a giver of information but it is who provides the society with the best of the brains to solve the prevailing problems.

The task of educating students is not easy and it only demands to be held exclusively by teachers that can impart skills along with information. Modern society demands that the schools must work with highly skilled professionals who can teach modern content according to the needs of society. The professionals are ideal for this purpose because they can devise the finest methods of instructing the learners in a way that they can learn skills and attitudes along with information (Arends, 2004). After the teacher, the second most important thing to consider is the method which can be used to teach science. Traditionally lecture method is prevailing in our education system as the only method being used to teach almost all subjects of arts and sciences as well. It is an instructional technique that is used by the teacher to develop interest among learners and impart new information, ideas, knowledge and techniques which will then enable the learner to critically analyze that content (Iqbal, 2010).

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Worldwide it is the most common method being used because it is useful in instructing several students at a time. Researchers are emphasizing on the fact that this method alone is not enough especially in teaching sciences as it only uses the theoretical flow of knowledge from the beginning till the end. So, the other ways of instructions must be explored which involve equal participation of the learners as well (Behr, 2006).

Activity-based learning can be used as an alternative to the traditional lecture method as it involves the learners to take part in the learning process as active participants rather than being passive listeners. It makes the learners to critically think about how to solve a problem by using the information presented to them in different activities. They do not only just learn content but learn different problem-solving techniques and skills. And for problem solvers, the content will not be a big thing for them to learn (Churchill, 2003). Researchers in the area of science education have come to a consensus that to get maximum from a science classroom we must move from 'imitating to innovating' to ensuring teaching learning quality (Shukla& Agarwal, 2005).

Several pieces of research have shown that students cannot retain knowledge which has been presented to them in a traditional way. Such types of activities cannot only help the students to retain knowledge but also motivate the students to participate in the teaching learning process. Science is not something that can be learnt only by listening it is a process which involves doing, reflecting, analyzing, critically thinking, evaluating and it all can only be done when the first step of "doing" will be completed and activity based learning is the only method which provides a chance of doing. Therefore, it is obvious that science- teaching is nothing without activities.

Statement of Research Problem

This research investigated the efficiency of activity-based teaching methods in helping elementary school students to understand the science concepts which are lacking in students of elementary schools due to prevailing traditional teaching practices.

Delimitations

The research was conducted on the 8th grade students. It was focused only on investigating students' ability of understanding General Science concepts.

Objective

More specifically the objective of this research was,

1. To check the effect of a lab-based teaching approach on students' ability of concept building in the subject of general science at elementary level.

Research Questions

1. Does activity-based teaching approach help in improving the students' ability to understand the general science concepts?
2. Does activity-based teaching approach help in improving the students' ability to memorize the general science content?

Significance of Study

The results of this study will be beneficial for both teachers and learners of elementary school students in terms of improving the methods of teaching-learning methods.

It would also be helpful for curriculum developers and course designers to incorporate maximum of activities in the science syllabi.

Teachers' training programs would be benefitted in preparing teachers in a manner that they would be able to refine their teaching methodologies.

Methodology

The procedure opted for this study was posttest-only control group research design. The sample was comprised of 8th grade students of FG School of Islamabad. The students were not from a very well socioeconomic background. 50 students were conveniently selected from 8th grade as sample of study.

Data Analysis

Table 1. Comparison of Posttest Scores of Control Group and Experimental Group in Concept Based Questions:

	Post-Test Mean	SD post test	df	t-value
Control Group N=25	10.72	1.13	48	5.06
Experimental Group N=25	12.72	1.63		

The mean score of control group in the posttest designed to check the students' ability to understand the concepts was 10.72 while the experimental group have the average score of 12.72. The mean score of both the groups was compared through t-test having value 5.06 at df 48 which is statistically significant.

Table 2. Comparison of Posttest Scores of Control Group and Experimental Group in Rote Memorization Questions:

	Post-Test Mean	SD post test	*df*	t-value
Control Group N=25	4.52	1.12	48	2.26
Experimental Group N=25	3.56	1.8		

The means score obtained by control group in the post test demanding the rote memorization ability of the students was 4.52 while in experimental group it was 3.56. The t-value was 2.26 at df 48 which is statistically significant.

Findings

Activity based learning is a new paradigm in science education and it is in great opposition to the traditional method of learning being used for centuries by making the students active learners rather than being passively taught. The results of this study show that activity-based learning proved very effective in teaching general science at elementary level. The experimental group performed significantly better in overall performance especially in concept-based questions demanding a deep understanding of the concept and a power to analyze the topic and synthesize new ideas based on the content being taught to them.

The suggest score acquired through the students of experimental organization in this test was 12.72 compared to the intended rating of 10.72 received by the control group. the t-price obtained changed into 5.06 at df 48 i.e. statistically full-size. those results are in line to the preceding researches of Schmidt et al., (2006), Hung et al., (2008), Aes and Yilmaz, (2011) and khan et al., (2012) who discovered that the performance of experimental institution became substantially better than control institution in terms of idea information. freedman (1997) and Turpin (2001) also reached the conclusion that the coaching technology with the palms-on activities produced significantly better outcomes than their counterparts. it is able to be due to the fact the students of the experimental organization had a real-time chance of experiencing the activities themselves as they accomplished all of the activities in comparison to manipulate group students who just listened passively what become being taught. additionally, the scholars of the experimental institution had a variety of questions and queries during the sports as they did no longer become bored in the entire length of the coaching learning method.

However, with regards to the writing content material inside the test annoying the rote memorization capability, the scholars of manage group completely outperform the students of the experimental group. the suggest rating of manage institution on this domain become 4.25 compared to the mean rating of 3.56 with t-value of 2.56 at df 48 which is statistically good sized. this was due to the fact as the students of manipulating institutions have been taught through lecture approach in which they simplest were given a hazard of questioning

their doubts at the cease of the lecture so that they could not apprehend the underlying concept. as they had now not understood the subject so that they went for cramming the content and the executed higher than students of the experimental institution in this domain.

As for the experimental group is concerned the students although they did understand the topic completely and performed the best in conceptual type question so they paid less attention to the learning content to write it. Such kinds of the results were also examined by McCarthy (2004) who studied the effect of activities as compared to textbooks taught students. The results showed that the experimental group may have performed better in the laboratory assessment, but the control group equally performed in the written type of exams. Likewise, Lieux, (2001) and Zumbach*et al*. (2004) could not find any significant effect in the results of the students of active classrooms and those who were taught traditionally. Similarly, Gallagher and Stepien, (1996), when took the short-term retention test could not find any difference in the results of both the groups. These results are also in agreement with the results of Bristow *et al*., 2000 who found no significant effect of activity-based learning in 6th grade science students' academic achievement but found that students were more motivated toward learning when taught with this method.

Conclusion

The consequences of this have a look at revealed that the interest-based teaching methods proved very powerful in idea constructing of the science subjects and students. the consequences showed that the students of the experimental institutions had higher know-how of the content but they did no longer memorize it for the written reason that's why carried out exactly in concept-based questions but the unfastened marks in reminiscence the traumatic questions in which the relative fabric along with the examples and the rationalization become required. from the results, its miles concluded that using best pastime-based teaching strategies can't produce fruitful results in our education gadget as our examination gadget requires the students to each recognize the concept and memorizing it for the written cause. consequently, the interest has to be paid to now not the handiest pastime-primarily based learning and assisting the scholars to make their ideas however additionally to make them examine and memorizes the content up to the requirement to without problems write what they have studied alongside suitable examples and explanation. so, to get better effects, it's far essential to comprise the activity-primarily based coaching and the strategies with the traditional coaching methods as each has its importance in the respective examination. An activity is better for understanding a science concept. The concept is either concrete or abstract it should be taught via activity based teaching methodology. If it is done since the very beginning that is elementary level, the understanding of such concepts especially abstract concepts is everlasting in the mind of children and they would be able to apply those concepts in their daily lives.

Recommendations

1. The role of activity-based teaching learning is well acknowledged; therefore, it is recommended that this approach must be adopted and incorporated in science classrooms along with the traditional teaching methods like book reading, memorization and cramming of the readymade materials.
2. It would be valuable in helping the students in concept building which is necessary especially in case of the science subjects and students studying those very subjects.
3. This study should be replicated to all the subjects and courses from the primary level till the university level through the elementary level as well as secondary level. They might be studied and the results of the activity-based teaching methodology would be reported accordingly.

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