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Impact of Activities on Performance among Science Students at Elementary Level

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Abstract: *The effectiveness of the activity-based teaching approach and the lecture method for science students' learning is evaluated in this study. The purpose of this study was to investigate the connection between teaching methods and student learning. In this study, the measuring instrument was an achievement test (post-test). The participants in this study were 8th-grade male students. Two groups of students were formed: experimental and control. The research data was compiled using the experimental and control groups' post-test scores. According to the findings, the study group's performance was better than the controlled group. In terms of information, understanding, and implementation capacity, the experimental group performed significantly worse than the control group. Overall, the findings of the study show that using the activity method to teach science at the elementary level is far more effective than traditional teaching methods. As a result, it was suggested that the students be taught through activities in the classroom*

Key Words: Lab Facilities, Secondary School, Science Laboratory

Introduction

The learner is able to determine from his or her own actions and experiences that he or she can continue to form world ideas. They see things through the lens of their own perceptions and concepts. They can improve their skills by using learning methods based on activity. "A child learns to dive by getting in the water; similarly, a child learns the best science by doing science" Colliver (1994). Students can use research to test concepts and comprehension in their lab work, which is not limited to reading or learning (David, 2007). As a result, the science teaching strategy is incomplete due to a lack of scientific knowledge. Pakistan's current educational situation is truly appalling. Teachers also use traditional science teaching methods, which have contributed to rote learning and true concept understanding, particularly in primary school. It is not the purpose of a science day to transform every student into scientists but rather to foster a positive mindset toward science in them. Apprenticeships, scientific principles and hypotheses must be tested, and the relationship between scientific ideas and theories must be actively pursued.

In Pakistan, education is based on the memorization of factual skills. Teachers lecture at all levels of science, but especially at the elementary level, which is unfortunate. Lessons are taught by teachers. As a result, the learners' unpredictability in understanding scientific principles, events, and hypotheses persist. Abdullahi (2005) has a different perspective on the traditional method of teaching, which is reading if the teacher has enough money. According to Zumbach et al. (2004). a type of

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active learning differs from traditional two-point schooling. Students take an active role in the first place, followed by student teamwork. Based on activity learning is defined by Tilgner (1990) as a method in which "students work or see something done in an active way." They claim that the ABT strategy "also necessitates the use of deceptive products." According to Churchill, significant learning was cited by Gallagher and Stepien (1996). According to Domin (2007), ABL allows students to "develop conceptual models that allow higher-order achievements, such as application of problem-solving, knowledge transmission, and skills."

As described by Mckeachie, based on activity learning is an approach in which students are interested in the "learning process" (1998). According to Harfield, Davies, Hede, and Panko Kenley (2007), in the teaching process, students engage actively rather than passively as listeners. Learning experiences based on "real life" aid in the transformation of knowledge or facts into personal knowledge that can be applied in a variety of situations (Norman & Schmidt,1992). According to McDermod (1996), it is difficult for a more experienced teacher to easily implement the teaching method, even if the teacher is likely to embrace it. Teacher dissatisfaction, a lack of money, content handling issues, inconvenience, a lack of time, a limited history of experiential approaches to science teaching, and textbook dependence are all factors that contribute to the use of handicrafts/mindsets (Piaget, 1980). Activity-driven learning (ABL) is a type of learning that is based on activity-oriented instruction models. This learning should be built on the foundation of experiments or exercises. When the learner is given the ability to consider and solve their own problems, learning becomes a lasting experience. The key features of based on activity instruction are that it relies on students and encourages self-learning. It also aids the student in studying for his or her own specialization. The purpose of the based activity approach to teaching science to students was to determine the efficacy of a causes/effects relationship between teaching practices and student learning.

In science classes, the teaching method is not entirely acceptable for a variety of reasons, but most teachers lecture at least 40% to 50% of the time. Because students do not participate actively in the teaching process, the teacher is the primary source of guidance and management of this information system in the classroom. When a class has a large number of students or teaching services are scarce, conferences are the only option. It's also useful when a syllabus's timetable has short gaps in it (Malhotra, 2006). Based on activity, the curriculum is an umbrella term for a series of activities with varying demands and purposes for both students' and teachers' skills (Frost, 2010). The constructivist goals and practices based on activity learning include both access to rich knowledge and collaboration. The set of exercises is regarded as the course pedagogy's main backbone, allowing students to "learn by doing" (Blumberg & Michael, 1992).

Statement of Problem

The topic of research is Impact of Activities on Performance of Science Students at Elementary Level Change classroom procedures, particularly the way teachers teach and the way children learn, should be a primary concern. It is a source of difficulty for students to learn the science subject without proper activities. Without proper activities, it is not possible for the teachers to deliver scientific knowledge in a better way. Due to this, students use the cramming method to learn the contents. So, this study is going to describe the significance of activities in the learning of science subjects in a conceptual way.

Objectives of the Study

1) To measure students' achievement taught through activity-based teaching in the science subject.
2) To compare the academic achievement of the experimental and control groups in the science subject.

Research Methodology

There are a variety of designs that can be used in an experiment. An experimental, non-

equivalent control group design was used in this study. As classes were used as they are in real-world contexts, one class was chosen to serve as a control group, while another class was chosen to be an experimental group. Prior to testing, a non-equivalent control group was chosen for the study design. Both the experimental and control groups were drawn from a single Punjab Text Book Board-approved school with the same curriculum. An elementary school in the Narowal district of Punjab was chosen to serve as both an experimental and control site. A total of 80 students were involved in this research. Because there were 40 students in each of the two groups (the experimental and the control), the experiment was able to proceed. Students in 8th-grade science will take part in this activity.

All 8th-grade science students in government schools in Narowal, Pakistan, were included in the study's population. Random sampling was used to select the study's participants. It is easy to select samples using random sampling, a low-cost data collection method that allows for precise timing of data collection, and it is well-suited for pilot studies. For this study, the researcher chose Maingari Elementary School as a representative sample. The researcher chose this school because of the ease of obtaining permission to conduct research and the willingness of the teacher to teach the control group at this school. In order to see how the activity method of teaching affected student performance, the researcher taught the experimental group. This group was taught using the same methods as the control group, which was mainly lecture-based. Each group received instruction equivalent to that of an eighth-grade science course. Teaching methods were the main difference between the two schools. Both teachers are appointed to the school based on the same set of standards and qualifications.

Tests were used to collect data in this study. Pre- and post-tests were used to measure the performance of students so that the effect of the activity method on academic achievement could be studied.

This was an experiment that was carried out in the laboratory. A quantitative approach was used in this experiment. A quasi-experimental study used a non-equivalent control group design with pre-and post-tests. In this study, the pre-and post-tests were identical. The Faculty of Education's experts gave the test their seal of approval. For a small number of students, the test was put through its paces before being put into use for the first time. The test-retest method value was used to calculate the reliability of the test. The value of the test-retest method was derived from the test pilot data. In order to select a sample, we used a simple sampling method. This study focused on a single school in Narowal, a district in Punjab. This study had a total of 40 participants. The experimental group consisted of 40 eighth-grade males. The control group consisted of 40 male students from the same school. Both groups took part in a pre-test.

Students in the 8th grade were taught 10 lessons using the activity method. Teachers in both the experimental and control groups used activity-based teaching methods to instruct their students. Ten lessons were taught over the course of a month and a half. Both groups were given a post-test. Using rubrics, the researcher graded the pre- and post-tests for both groups. T-tests were used to compare the performance of students in the experimental and control groups on the pre- and post-tests. SPSS was used to perform a statistical analysis of the data.

Results

Table1. The difference in students' marks in pre-test as well as post-test using the lecture method

variable	category	N	Mean	SD	df	t	Sig
Question 1	pre-test	40	3.38	1.02			
	post-test	40	4.06	0.97	98	-3.39	.145

Table 1 describes the results of statistics of the t-test which is independent and reveals that there is no statistically difference significantly between the mean score of the pre-test (M=3.38, SD=1.02) and the mean post score of a test (M=4.06, SD=0.97) of a test conducted by a scholar with t-value=-3.39, degree of freedom=98 and p=0.00 at significant value=0.05. It can, therefore, come to an end that there was no difference significantly (0.145>0.05) between the mean score of the pre-test as well as the post-test by teaching students by lecture method. So from the above statement, it can be concluded lecture method does not improve the student's performance in science subjects.

Table 2.

variable	category	N	Mean	SD	df	t	Sig
Question 2	pre-test	40	3.54	0.97			
	post-test	40	4.76	0.77	98	-6.94	.142

Table 2 describes the results of statistics of the t-test which is independent and reveals that there is no statistically difference significantly between the mean score of the pre-test (M=3.54, SD=0.97) and the mean post score of a test (M=4.76, SD=0.77) of a test conducted by a scholar with t-value=-6.94 degree of freedom=98 and p=0.00 at significant value=0.05. It can, therefore, come to an end that there was no difference significantly (0.142>0.05) between the mean score of pre_test as well as the post-test by teaching students by lecture method. So from the above statement, it can be concluded lecture method does not improve the student's performance in science subjects.

Table 3.

variable	category	N	Mean	SD	df	t	Sig
Question 3	pre-test	40	2.6	.80	98	-10.89	0.15
	post-test	40	5.02	1.34			

Table 3 describes the results of statistics of the t-test which is independent and reveals that there is no statistically difference significantly between the mean score of the pre-test (M=2.6, SD=.80) and the mean post score of a test (M=5.02, SD=1.34) of a test conducted by a scholar with t-value=10.89, degree of freedom=98 and p=0.00 at significant value=0.05. It can, therefore, come to an end that there was no difference significantly (0.15>0.05) between the mean score of pre-test as well as a post by teaching students by lecture method. So from the above statement, it can be concluded lecture method does not improve the student's performance in science subjects.

Table 4

variable	category	N	Mean	SD	df	t	Sig
Question 4	pre-test	40	2.72	.83	98	-7.98	0.965
	post-test	40	4.12	.91			

Table 4 describes the results of statistics of the t-test which is independent and reveals that there is no statistically difference significantly between the mean score of the pre-test (M=2.72, SD=.83) and the mean post score of a test (M=4.12, SD=.91) of a test conducted by a scholar with t-value=-7.98, degree of freedom=98 and p=0.00 at significant value=0.05. It can, therefore, come to an end that there was no difference significantly (0.965>0.05) between the mean score of pre-test as well as a post by teaching students by lecture method. So, from the above statement, it can be concluded lecture method does not

improve the student's performance in science subjects 4.2 Data Analysis of Pre-test as well as Post Test Using Activity-Based Method.

The difference in students' marks in pre-test as well as post-test using Activity Based Method

Table 5.

variable	category	N	Mean	SD	df	t	Sig
Question 1	pre-test	40	3.56	1.01	98	15.9	0.02
	post-test	40	7.08	1.19			

Table 5 describes the results of statistics of the t-test, which is independent and reveals that there is a statistical difference significantly between the mean score of the pre-test (M=3.56, SD=1.01) and the mean post score of a test (M=7.08, SD=1.19) of a test conducted by a scholar with t-value=15.9, degree of freedom=98 and p=0.00 at significant value=0.05. It can, therefore, be concluded that there was a difference significantly (0.02<0.05) between the mean score of the pre-test as well as a post by teaching students by the activity-based method. So from the above statement, it can be concluded that the activity-based method improves the student's performance in science subjects.

Table 6.

variable	category	N	Mean	SD	df	t	Sig
Question 2	pre-test	40	3.26	0.96	98	18.89	0.017
	post-test	40	7.44	1.23			

Table 6 describes the results of the statistics of the t-test which is independent and reveals that there is a statistical difference significantly between the mean score of the pre-test (M=3.26, SD=0.96) and the mean post score of a test (M=7.44, SD=1.23) of a test conducted by a scholar with t-value=18.89, degree of freedom=98 and p=0.00 at significant value=0.05. It can, therefore, come to an end that there was a difference significantly (0.017<0.05) between the mean score of pre-test as well as a post by teaching students by the activity-based method. So from the above statement, it can be concluded activity-based method improves the student's performance in science subjects.

Table 7.

variable	category	N	Mean	SD	df	t	Sig
Question 3	pre-test	40	2.52	0.70	98	23.83	0.000
	post-test	40	7.2	1.19			

Table 7 describes the results of statistics of the t-test which is independent and reveals that there is a statistical difference significantly between the mean score of the pre-test (M=2.52, SD=0.70) and the mean post score of a test (M=7.2, SD=1.19) of a test conducted by a scholar with t-value=23.83, degree of freedom=98 and p=0.00 at significant value=0.05. It can, therefore, come to an end that there was a difference significantly (0.00<0.05) between the mean score of the pre-test as well as a post by teaching students by the activity-based method. So from the above statement, it can be concluded activity-based method improves the student's performance in science subjects.

Table 8

variable	category	N	Mean	SD	df	t	Sig
Question 4	pre-test	40	2.7	0.76	98	26.339	0.0
	post-test	40	7.42	1.01			

Table 8 describes the results of statistics of the t-test which is independent and reveals that there is a statistical difference significantly between the mean score of the pre-test (M=2.7, SD=0.76) and the mean post score of a test (M=7.42, SD=1.01) of a test conducted by a scholar with t-value=26.339, degree of freedom=98 and p=0.00 at significant value=0.05. It can, therefore, come to an end that there was a difference significantly between (0. (0.00<0.05)<0.05) mean score of pre-test as well as a post by teaching students by the activity-based method. So from the above statement, it can be concluded that activity-based method improves the student's performance in science subjects.

Table 9. Pearson correlation among variables

		L.M Post	A.B POST
L.M Post	Pearson Correlation	1	.341*
	Sig. (2-tailed)		.015
	N	40	40
A.B POST	Pearson Correlation	.341*	1
	Sig. (2-tailed)	.015	
	N	40	40

*Significance Level **P ≤ .05*

The above table depicts that the calculated value of Pearson correlation is .341 which is less than 1 and the calculated significance value (.015) is less than the significance level (.05). It indicates that there is a statistically significant correlation (.015 < .05) among the variables that students have a difference significantly in the marks obtained by activity-based teaching and lecture method. Students who were taught by activity-based method got more marks as compared to students taught by the lecture method.

Discussion

The purpose of this study was to compare the academic success of students who were taught using activity-based methods versus students who were taught using the lecturer method. The use of activity-based methods as an experimental pedagogic technique was found to be a significant academic difference between the two classes of learners, according to the study's results. Because the group outperformed their peers, the use of an activity-driven teaching approach has proven to be very effective in teaching and studying basic science in various secondary schools. These findings are linked to other study findings in this field. For example, in a study by Binta (2014), academic performance for students exposed to teaching methods was found to be lower than that of those who were subjected to a collaborative teaching approach. These findings are similar to Choo's (2007) findings report, which suggests that properly introducing students to learning can have an impact on student achievement. Not only that, but it was also clear that 90,4 percent of the participants valued event-based learning. The study also revealed that activity-based methods focused on activity were structured to prepare students to be self-sufficient.

Students' reluctance to take chances and participate in active learning has never been proven by studies (Benson and Blackman, 200; Bonwel and Eson, 2007), who have discovered the opposite. Active participation in active learning might be dangerous for students.

Small class sizes and an experiment taking place in an upper-class classroom may be to blame for students' lack of dread of participating. Science classes taught utilising activity-based methods and lectures are notably different when it comes to students' performance scores (Achievement Test). Neither group was made aware of the study's findings, and they received the same level of care. The experimental and control groups were compared for post-test findings. As expected, the experimental group fared much better than did the post-test control group. According to the numbers, the experimental group's efforts had a considerable impact on their ranking. The aims of the two instructional styles are very different. The pupils' total performance was affected by the differences in the general frameworks of these two methods. Using an activity-based approach, pupils are better able to comprehend what they're learning. It helps pupils improve their ability to think logically and to put their learning into practice.

Azuka (2013) found that when students engaged in the lessons effectively, they grasped math principles and reported higher retention rates. In their study into activity-based learning in mathematics methods. She emphasized the importance of teachers taking a break from the "telling process" And focusing on methods that promote successful learning.

Losardo and Bricker (1994) found little difference in the results of an activity-based technique versus a direct teaching approach in their contrast analysis. The skills learned through embedded direct teaching, on the other hand, were marginally better preserved than those learned through the activity-based intervention. Their assumptions contradict the findings of this research, which show that ABST has a significant impact on talented students' academic success. In terms of research and fundamental learning, the implementation of an activity-based teaching approach has a significant impact on the academic success and accomplishment of promising students in junior high schools. In the post-test average scores of exceptional students who were taught fundamental scientific research, there is a difference significantly from that of their classmates who were taught the same subject constructs by the traditional teacher-centered approach. Students who were exposed to the operation-based teaching method had higher average scores on fundamental science principles to research and comprehended. As a result, the inherent components and responsibilities of learners in activity-based learning approaches are more successful in supporting master's learning and thus increasing the retention of talented students in the subject.

Both in literature and in the experiment's operation and evolution, it is clear that there are significant drawbacks to the activity-based learning strategy, despite its obvious advantages for students. This style of learning isn't always possible in traditional classroom settings, according to Bonwell and Eison (2007). The difficulty of interacting in small groups is exacerbated by the inability to choose between rooms that are either too big or small. In order to properly implement the project, which must be incorporated into the overall management of a programme, additional time and resources were investigated. As with any strategy, there are positives and negatives to both options. An investigation into how 9th-grade pupils learn about general science was the focus of this study.

Recommendations

Because the goal of this study was to see if there was a difference in research performance when they were taught using activity-based methods versus lecture methods, some recommendations were made based on the findings.

- As it has been observed that boards of intermediate and secondary education arrange for practical work and students are required to appear in exams, a way should be set to assess students' practical skills at the elementary level. If this is done, the teacher will also perform classroom activities because they are

aware that their students will be assessed on practical skills and activities.

- It is necessary to provide the necessary Apparatus to the teacher in order for them to perform activities in the classroom.
- It has been set that elementary schools lack labs, making it impossible for teachers to perform activities in the classroom. As a result, they must occasionally visit high-level labs. Laboratories should be set up at the elementary level so that students can carry out their activities.
- It is the responsibility of higher authorities to ensure that teachers are engaging in science-related activities in their classrooms.
- In the school timetable, there should be a space for activities so that features can ask students to perform activities in the classroom.
- At the elementary level, QAED should design teacher training programs that place the greatest emphasis on teachers performing activities related to science subjects.
- Science subjects should be more practical in nature in order for students to learn practical concepts rather than theoretical ones.
- In the science project, there should be activities related to daily life experiences so that students can learn science concepts in a conceptual way. During the research, it was discovered that some of the activities included in science projects are not feasible at the school level. On the other hand, some activities in the science projects were simple enough for students to perform even at home, so it is recommended that activities be related to everyday life experiences.
- It is the teacher's primary responsibility to encourage students to participate in activities that the teacher conducts in the classroom so that they can learn more about science and scientific knowledge.
- Information Technology should be included in all teacher training programs so that they can use it in their classrooms to perform science-related activities.
- Online resources should be included in elementary textbooks, just as they are in secondary textbooks so that students can visit such websites to gain a conceptual understanding of science subjects and be able to perform activities in the classroom by watching videos related to different activities.
- Funds should be allocated to elementary schools so that laboratories can be built.
- If this is done, instead of lecturing, the teacher will be able to teach students using activity-based methods.
- It was also discovered during the study that there was no assessment of students' practical skills at the elementary level, so it is suggested that students be evaluated on their practical knowledge in science subjects rather than their theoretical knowledge. Students will also perform activities related to science subjects at school in this way.
- It is critical to hire elementary-level teachers who are well-versed in science. It is because they have sufficient experience in science subjects and can easily perform activities in the classroom, and students will perform better in a conceptual way with the help of activity-based learning. Science graduates should be given first priority when it comes to teaching in elementary schools.

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