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Exploring the Effects of Activities on Grade V Students Perform In the Subject of General Science

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Exploring the Effects of Activities on Grade V Students Perform In the Subject of General Science

Abstract:

Activity-based teaching has emerged as an effective pedagogical approach that actively engages students in the learning process through hands-on experiences, collaboration, and problem-solving. Unlike traditional lecture methods, this approach fosters curiosity, critical thinking, and meaningful understanding of concepts. Research indicates that when students participate in activities such as group discussions, experiments, role plays, and projects, they develop deeper conceptual knowledge, improved retention, and enhanced communication and social skills. Moreover, activity-based teaching creates an interactive classroom environment that caters to diverse learning styles, motivates students, and encourages self-directed learning. Overall, the positive impact of activity-based teaching highlights its potential to improve both academic performance and holistic development of students, making it a valuable strategy for effective learning in contemporary classrooms.Researcher used experimental design for the study. The study was qualitative in nature. For analyzing the data researcher used t–test for comparing the achievement score of control group and experimental group students. The findings of study showed that students learn best when they actively participate and taught by activity based method.

Introduction

The academic success of all students in science has become a global priority, as governments around the world increasingly recognize that their economic future depends on a scientifically skilled workforce (Kilpatrick & Quinn, 2009; Duschl, Schweingruber, &Shouse, 2007).A key focus in policy discussions is science education at the elementary level, where children's early attitudes and interests toward science are formed. However, science education in elementary schools remains particularly challenging. Numerous studies have found that many elementary teachers lack confidence in their own science knowledge and feel uncertain about teaching the subject (Harlen&Qualter, 2008; Cobern& Loving, 2002; Pell & Jarvis, 2003).

While numerous studies have reviewed various aspects of science teaching, there has been limited attention given to concise reviews of evaluations of alternative approaches to elementary science education. Effective science teachers play a crucial role in developing students' conceptual understanding of science. This involves not only engaging students in scientific practices but also helping them learn about how science works (Anderson, 2001; Crawford, 2007).

Science is a collection of empirical, theoretical, and practical information about the natural world that is generated through refresher courses using the scientific method, which places a priority on observations, explanations, and experimentation to predict real-world phenomena. (Misra&Yadav, April, 2013).

Science imparts an appreciation of ourselves, the universe, and our place in it, which must be regarded as one of humanity's greatest achievements. Although different innovations and crafts are much older than theoretical science, it is a proven fact that science-based technologies, such as the numerous applications of knowledge of the properties of electricity, have a positive impact

on human welfare. As a result, there are plenty of economic benefits for both individuals who study science and countries whose inhabitants include a large number of people with extensive scientific expertise.Furthermore, many of the contemporary societal challenges, such as upcoming energy and population crises, global warming, and ethical dilemmas concerning biotechnology, require a scientific understanding in order to be addressed effectively. The acquisition of scientific literacy should be considered almost as important as learning basic literacy(Waterloo, Ontario, May, 2005).

Students' performance in science subject has been suggested to be improved through hands-on experience. An array of recommendations has been put forward to explain how hands-on experience improves pupil's comprehension of science. Science educators consider two types of scientific knowledge: content knowledge and process skills.The facts, principles, conceptual models, theories, and laws that students are supposed to comprehend and retain are all included in content knowledge, sometimes referred to as declarative knowledge. Process knowledge, also known as process knowledge, refers to the approaches commonly used in science, such as measurement, hypothesis development, and observation, which students need to acquire.Both of areas are necessary for students to learn and apply science (Glynn and Duit 1995; Champagne, Kloper and Gunstone 1982; Eylon and Linn 1988). Direct participation in science has been advocated as a mean for strengthening the understanding of learners in every type of knowledge.

In contrast, conventional science direction lean to be less charismatic and rarely inspire pupil to explore, ask questions, or create discoveries. This approach is typically teacher-centered and depends primarily on opportunity accessible within the school. The main core is on finding one

correct answer and systematically understanding the content. There is less attention on the procedure of knowledge and unfolding scientific skills. Classical science teaching is concentrated around what is already known and does not make use of technology to support learning.

According to Prince (2004), activity-based learning is a form of teaching in which students are driven to participate in the learning process. Harfield, Davies, Hede, and Panko Kenely (2007) argue that students actively participate in the learning experience rather than sit as passive listeners.Real-world experience-based learning activities enable students in refining knowledge into their own unique knowledge that they can employ in a variety of real-life scenarios. In activity-based learning, students analyse the learning objectives and consider solutions to a given challenge. Content is not imparted to the kids. They learn about the problem-solving process rather than the subject matter.Without the enthusiasm of learners, learning and instruction cannot be done effectively. Hake (1998) makes the case that motivating students through collaborative tasks is a practical and efficient way to educate difficult ideas.

Significance of the Study

Presenting different types of learning through exercises is essential to raising pupils' academic performance. This is being done for improved comprehension of every aspect of scientific education and how science-related tasks affect the achievement of learners. This study aims to investigate how science-related activities affect students' performance.

Students can explore and comprehend their world through practical experiences in science. Students in this subject are given a setting where they can observe, explore, discover measure, compare, classify, and forecast in order to gain an understanding of their surroundings. Students

in this subject are given a setting where they can observe, explore, discover measure, compare, classify, and forecast in order to gain an understanding of their surroundings.

Objectives

- To find out the effect of activity based teaching on students' performance in the subject of General Science.
- Investigate the effects of activity based teaching on the different groups of students on the basis of Socio economic status.

Research Question

1. What are the effects of activity based teaching on students' performance?
2. What are the results of control group and experimental group on the basis of activity based teaching?
3. What are the learning outcomes at the end of 5^{th} graders educated through ABL methodology?

Review of Related Literature

Science is the methodical, evidence-based process of acquiring and applying knowledge and understanding of the natural and social worlds. Science is the process of determining what, given the available data, is most likely to be true at any given moment. Only reliable proofs have been used to derive rational explanations. Stated differently, exceptional science is predicated on data that can be observed, quantified, and confirmed by other scientists (National Academy of Science, 1998).The word "science" is comparatively new. However, there is documentation of scientific procedures, principles, and strategies in almost every civilization. Both the professional tradition, which transmitted away and refined concrete expertise and abilities from one generation to the next, and the psychological tradition, which transferred on further developed human aspirations and ideas, are the two fundamental sources from which science has its historical roots (Mason, 1962).

Science gives students the opportunity to engage with the world around them and form opinions about phenomena through firsthand experience. Their scientific studies give them the tools to observe and enquire about what is occurring when they try things like seed germination. Through experimentation, they can start to figure out and forecast what would occur if the conditions that plants grow in change. Students need assistance in acquiring the procedural skills necessary to conduct investigations and the communication skills necessary to challenge and discuss discoveries in order to learn science in this manner.

Strategies Used For Effective Science Teaching

To assist students in applying their newly acquired knowledge, teachers can use a variety of techniques, including inquiry-based learning, role play, field trips, problem-solving,simulation discussion, and cooperative learning.Students can apply newly learnt

knowledge or skills and gain firsthand experience of phenomena discussed in theory through practical work (Krischer, 1992; Hodson, 1993; 1996; Arce and Betancourt, 1997; Johnstone, 199; Amos and Boohan, 2002; Millar, 2002). Students can test, reconsider, and rebuild their ideas and thoughts as they work on actual projects.These factors led to numerous studies showing that students' comprehension and retention of information were enhanced by hands-on experience (Hewson and Hewson, 1983; Stohr-Hunt, 1996; Dawe, 2003). According to Dawe, these favourable results might arise from students taking responsibility for the ideas they acquire as they "discover" the information on their own through hands-on practice.

Students can connect their knowledge with the natural world and practical applications of scientific concepts or processes through field visits, which give them relevant contexts (Glynn and Duit, 1995; Griffiths and Moon, 2000; Tytler, 2002a). For instance, Scherf (1992, quoting Killerman 1998, p. 5) examined the impact of field trips on pupil mindsets and academic performance and discovered that students who took part in lessons outside of the classroom showed a noticeably higher capacity for plant recognition than those who only studied plants in the classroom. However, because of tight teaching budgets and increasingly demanding curricula, fieldwork isn't always feasible. Nonetheless, by bringing in live plants, animals, images, models, and student work, educators can introduce the natural world into the classroom.Interactive classroom activities have received a lot of attention lately because it is widely acknowledged that students must actively participate in the learning process in order for learning to be effective (Roth and Roychoudhury, 1994; Strage and Bol, 1996; Stepnak, 2000, Parkinson, 2004). Furthermore, studies think that the more pupils participate in the learning process, the better. According to Taras (2002), student-centered learning has, in principle, encouraged and resulted in increased pupil engagement and commitment.Active

learning strategies can boost students' willingness to learn by enabling them to make wise choices and actively participate in their own education. According to researchers, this is because active learning fosters a sense of personal responsibility and ownership. Students view their work as significant and their thoughts and discoveries are appreciated in active learning environments.According to Amos (2002), a friendly, encouraging learning atmosphere where students feel free to ask questions, share their perspectives, and need support and encouragement is also necessary for their active engagement. Students become more confident and take part in activities more when they actively participate in group activities and recognize that the group members value and respect their ideas and opinions (Brown, 1995).Effective lesson planning is necessary for any approach to succeed, though (Henson and Eller, 1999; Harlen, 1999). A lesson plan necessitates that the instructor be explicit about the order of the activities in the lessons as well as the objectives and purpose of the lessons. Clarifying the roles of the teacher and students is part of the planning process.As a result, it facilitates students' comprehension of the teacher's material and motivates them to engage more fully in the class and take ownership of their education (Good and Brophy, 1994; Calderon et al, 1996). Effective lesson planning benefits students' learning for these reasons (Brown, 1994; Tomic, 1994; Glenn, 2001).Nevertheless, the researchers believe that instructors ought to be somewhat adaptable when it comes to lesson design. One of the most popular methods teachers use to engage their students is questioning. This will make the kids more engaged and active in class. This type of setting is more encouraging and facilitates students' engagement in class activities and instruction.The use of open-ended questions is advocated by Amos (2002), who contends that closed, subject-oriented questions that rely on logical reasoning and linear processes deter students from thinking differently than the

teacher and may even deter students from responding to the questions. For the learning and growth of pupils, the process of asking questions is just as crucial as the type of questions posed. Giving students enough "wait time," roughly three to five seconds, after posing a question not only boosts their engagement but also gives them a fantastic chance to think critically and generate more ideas and answers (Yates and Yates, 1990; Bliss, 1995; Trowbridge et al, 2000; Amos, 2002).

Role-playing is another effective teaching and learning technique that can be used to adapt students' knowledge and motivate them to participate more in the courses. Nonetheless, scholars note that role-playing is underappreciated and underutilized in science classes, frequently due to misunderstandings regarding the nature of role-play and its applications in science education (Resnick&Wilensky, 1998; McSharry and Jones, 2000).According to McSharry and Jones (2000), the philosophy underlying role-playing in science education promotes "active," "experiential," or "student-centered" learning. Students are consequently encouraged to participate both intellectually and physically in their classes in order to help them understand complex ideas and to articulate themselves in a scientific setting. Additionally, Resnick and Wilensky (1998) note that role-playing exercises are very important for assisting students in learning difficult subjects.Cooperative learning groups (Slavin, 1990; Kagan, 1992; Jones and Carter, 1998; Goodrum, 2001) and inquiry-based teaching and learning (Trowbridge et al., 2000; Deboer, 2002) are also beneficial settings where students actively engage in the learning process to build their own understandings of scientific knowledge. Another crucial approach to teaching and learning science is the discussion method, which allows students to share their understanding of the lesson with the

teacher. The teacher will then encourage student participation and make accommodations for their knowledge where necessary.

The demonstration approach is typically more advantageous in science labs and can also be a helpful way to teach science. To put it briefly, student participation is essential to their education. Students' learning, comprehension, and drive to learn can all be improved by active engagement. In addition to presenting means for pupils to take part in the lessons, teachers should ensure that their students are engaged in the material. All science graders can benefit from the activity-based method, which is one of the most significant and advantageous approaches to teaching and learning science. Teachers can enhance students' comprehension of science lessons and science learning by employing this approach.

Dewey and Piaget (1985) assert that knowledge is not taught by others but rather is learnt by students from their environment. Young kids rarely completely understand knowledge that is presented in lecture format. For children to form mental images of abstract concepts, they must handle and use tangible materials. Their newly learnt material needs to be repeated in order to be retained, and hands-on science provides opportunities for reinforcement. Activity-based learning has been regarded as the best approach to teach kids science ideas during the past few decades. These exercises seem to be more pedagogically suitable and generate excitement, confusion, and surprise (Bredekamp&Copple, 1997). A excellent science exercise would introduce kids to basic science ideas while also providing them with a developmental opportunity.

Activity based approach in teaching Science

Pupils acquire knowledge through active engagement and hands-on experience when teachers use the activity-based technique. As they studied fundamental ideas, the pupils participated in motor exercises. Despite being widely recognized as a paradigm for science education through activity-based teaching, which is also somewhat mirrored in national and provisional textbooks, it has barely been implemented in real classroom settings. Instead of being used as a tool for open-ended research, activities are still frequently seen as a means of defending the concepts presented in the book. The teaching approach must be appropriate for the kids' age, mental capacity, societal norms, and the resources that are accessible in the classroom. Students are effectively engaged and motivated in the learning process by this method of teaching science. Both the lecture method and the activity-based approach are focused on the needs of the students. Students in primary school are in functional and tangible stages, where intellectual growth is crucial. Therefore, it is crucial for kids to learn joyfully at this point. Various educators, including Rousseau and Devey, have emphasized the need of an activity-based approach in teaching.

Elementary school pupils lack the capacity for formal thinking. They have trouble abstracting concepts and are drawn to physical, concrete objects. They can focus on one thing for a lengthy. At this age, children's curiosity is their most prominent trait. They enjoy energetic activity and find it uncomfortable to sit with guilt for extended periods of time. They like participating in a wide range of activities. They rarely let their minds rest. At this point, there is a larger need for recognition. They want to be appreciated for everything they have done, no matter how minor. Children's engagement, direct observation, and experience can all be used to evaluate learning using activity-based learning.The activity-oriented technique gives students the chance to collaborate with one another. By using an activity-based approach in

the teaching and learning process, competences can be attained. Improving the standard of primary education is essential to raising the standard of instruction in classrooms. Students at this stage will find the school appealing if it can provide them with a variety of learning opportunities through their participation in different activities. Teachers provide guidance for these activities in the classroom.

Methodology and Design of the Study

In this study, researcher focused on general science at the elementary level. This chapter discussed the methodology procedure used to conduct the study. The study was qualitative in nature. The current study was designed to investigate the efficacy of activity-based learning at the basic level. This section described the demographic, sample, research tool, measurement tool, instructional tool, research design, activity execution, data collecting, and data analysis.

Population

The study's population consisted of 60 fifth-grade students studying general science. In fifth grade, there were two sections of 60 kids each studying general science. A group of 30 students was selected for the experiment, while another 30 students were chosen for the control group.

Sample

This study was carried out in a school in the Lahore district. The school was chosen based on convenience. The study's sample was Class V. The investigators chose the sample using a specified sampling process. Sixty pupils were chosen and divided into two groups of thirty each.

Research Design

This was an experimental investigation. Experimental research entails collecting data in order to evaluate hypotheses about the relevant variables. Generally, experimental research includes members of the groups being treated. In this study, students were divided into two groups using the pre-test, post-test, control group design.

Pre-test-post-test control group design

Groups	Pre-test	Independent variable	Post-test
Experimental group	T_{11}	New treatment	T_{21}
Control group	T_{12}	traditional treatment T_{22}	

This framework was chosen to handle every aspect of internal validity. The Pre-test controls mortality, while the control group controls maturity, history, testing, and instrumentation. The selected students were separated into two groups. Out of two groups, one was assigned to the experimental group and the other to the control group.

Research Tool

For this study, the researcher used two distinct techniques to assess student achievement. Both instructional and measuring tools were used as primary instruments in this study.

Measuring Tool

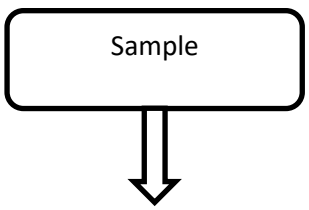
The teacher-designed performance test was employed as a measurement tool. The test was designed to assess students' ability in broad science.

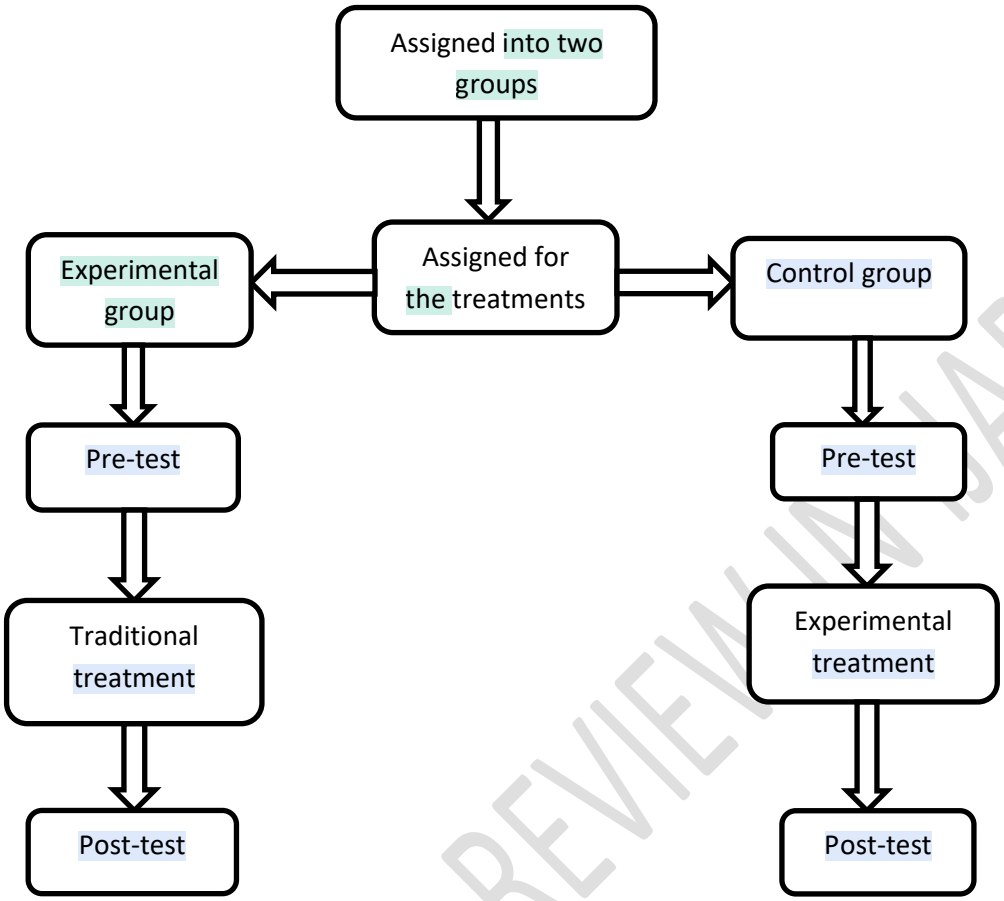
Instructional Tool

The teaching tool relied on a specific lesson plan that includes five steps: introduction, presentation, various activities, recapitulation, and evaluation. Lesson plans were designed in distinct sub-units of each topic. Taking into account the needs of students and the activities to be completed for each sub-unit. The activity-based materials were created based on the unique competencies of each and every sub-unit.

Data Collection

After selecting the required sample, it was divided into two groups, with one group allocated to the experimental group and the other to the control group. The initial achievement results of both groups were recorded using a teacher-created achievement test in science. The researcher taught the experimental group using an activity-based approach, whereas the control group received standard instruction. After the treatment, both groups were examined. Post-test scores from both groups were compared to determine the impact of an activity-based strategy on student achievement in science.





Data Analysis

Researcher examined the data. Data were analyzed using SPSS software. Statistics will be presented as charts, statistics, and tables.

Analysis and Interpretation of Data

This chapter focused on data analysis and interpretation. The study question was titled "Develop design and implement activities of 5th grade general science subject and its effects on students' performance". The data was collected via a questionnaire. SPSS 15 (Statistical Package for

Social Science) software was used to analyze data using t-tests, ANOVA, frequencies, percentages, and mean scores.

Table 4.1

Frequency distribution of demographics

Variables	Frequency	Percent
Father education		
Above intermediate	9	15.0
Matric/Inter	49	81.7
Illiterate	2	3.3
Mother education		
Above intermediate	3	5.0
Matric/Inter	55	91.7
Illiterate	2	3.3
Father occupation		
Private	41	68.3
Government	17	28.3
Father Income		
5000 to 20000	58	96.7
Above 20000	2	3.3

Mother occupation		
Social worker	1	1.7
Housewife	57	95.0
Mother income		
5000 to 10000	1	1.7
0	57	95.0
Government job		
Yes	41	68.3
No	17	28.3
Computer availability		
Yes	18	30.00
No	42	70.0
Chair, table availability		
Yes	26	43.3
No	34	56.7
Pocket money		
0 to 50	58	96.7
00	2	3.3
Car, Bike		
Yes	31	51.7
No	29	48.3
Member of job		
More than one	13	21.7
One	45	75.0

Table 4.1 shows that 82% of respondents' fathers have matric/intermediate qualifications, while 92% of respondents' mothers have matric/intermediate education. 68 percent of respondents' fathers work in the private sector. 96% of respondents' fathers earn less than 20,000; 95% of respondents' mothers are housewives with no income; 68% of respondents' fathers do not work for the government; and 70% of respondents do not have access to a computer. 56% of respondents do not have a chair and table to study on, and 96% had less than 50 in pocket money. 51% of the participants own a car or motorbike. 51% of participants have only one job, while 51% of respondents rent their homes.

Table 4.2

t-test to compare the Pre-Test achievement score between the experimental and control groups

Variables	Group	N	Mean	S. D	t	df	p
Pre Test Score	Control	30	22.13	5.00850	-1.221	58	.227
	Experimental	30	23.63	4.49124			

According to the above table, the t-value (1.822, df=58, p=.227) is not significant at the α<.05 level of significance. The experimental (M=23.63) and control (M=22.13) mean achievement scores are nearly identical. Consequently, it can be said that the pre-test achievement scores of the experimental and control groups in the General Science subject were nearly identical and did not differ significantly.

Table 4.3

t-test for comparison of Post-Test achievement Score on the basis of control and experimental group

	Group	N	Mean	S. D	t	df	p
Post Test Score	Control	30	25.40	5.09	-10.73	58	.000
	Experimental	30	41.43	6.40			

The t-value (-10.73, df=58, p=.000) is significant at the level of significance (α<.05), according to the table above. The experimental group's mean achievement score (M=25.40) is higher than the control group's (M=41.43). As a result, it can be said that the experimental group's post-test accomplishment score in the general science topic was superior to that of the control group and showed a statistically significant difference.

Table 4.4

Achievement score of students on the basis of lower SES and high SES

Variables	*SES*	*N*	*Mean*	*SD*	*t*	*df*	*p*
Total score	*lower SES*	*43*	*22.34*	*4.26*	*-1.152*	*56*	*.254*
	High SES	*15*	*23.94*	*5.43*		*0.37*	*.317*

The estimated t-value (4.26, df=56, p=.254) was discovered to be statistically not significant at a significance level of 00.05. The mean accomplishment scores of the control (M=22.34) and experimental groups (M=23.93) were found to be nearly identical. According to these data, the

pre-test achievement scores in General Science for both groups were comparable and did not differ significantly.

Chapter 5

Summary, Findings, Conclusion and Recommendation

Summary

The goal of this study was to determine the effects of activity-based teaching on elementary students' academic results. The first chapter introduction described the study's objectives, research issues, and importance. In the second chapter, the researcher investigated related literature from various sources to meet the objectives. The associated literature included an introduction to the issue, definitions, terminology, types, and characteristics. In the third chapter, the researcher described the study's design, demographic, sample, research tools, instructional tool, data collection procedure and approach. The fourth chapter covered data analysis and interpretation of outcomes. In the final chapter, the findings, conclusion, and recommendations are written.

Findings

On the basis of data analysis the following findings were drawn.

Q1. What are the effects of activity based teaching on students' performance?

This inquiry examines the impact of activity-based teaching on student achievement. Data study revealed that activity-based teaching helps students learn the most effectively. They expressed a greater interest in general science and preferred hands-on experience over traditional education. In teacher-centered teaching, the majority of students learn by rote. In contrast, with activity-based learning, students participate actively and demonstrate a greater interest in learning.

Q2. What are the results of control group and experimental group on the basis of activity based teaching?

This question affects the results of the control and experimental groups using activity-based education. The results of data analysis revealed that the experimental group of students performed better in science than the control group of students because the experimental group was taught using an activity-based strategy while the control group was taught using a standard way of instruction. The experimental group students performed higher on knowledge understanding and application-based tasks. All pupils in the experimental group actively participate in classroom activities, whereas control group students do not. The students in the experimental group have an excellent understanding of science and can use their knowledge in real life.

Q3. What are the learning outcomes at the end of 5th graders educated through activity based methodology?

This question find out the effectiveness of activity based teaching on students learning outcomes. The results of table 4.2 data analysis found that pretest achievement score on the basis of control and experimental group result is t–value (1.822, df=58, p=.227) is not significant at level of significance (α<.05). The mean achievement score of control group (M=22.13) is almost similar with experimental (M=23.63). Therefore, it is concluded that pretest mean score of general science of both groups were almost similar and not differed statistically.

Table 4.3 shows that t–test for comparison of post–test achievement of both control and experimental groups that t–value (−10.73, df=58, p=.000) is significant at the level of significance (α<.05). The mean score of experimental (M=41.43) is greater than of mean achievement score of control group (M=25.40). Therefore it is concluded that post–test

achievement score of experimental group students was better than control group and differed statistically.

Conclusion

The following conclusion is based on the findings and student performance on the pre- and post-tests:

This study supported the researcher's theory that experiential learning is the most effective way for elementary school pupils to learn. Results of the study showed socioeconomic status have done nothing to students' performance and achievement. Her belief that students must participate in their classes was reinforced by the numerous questions those kids asked, demonstrating their curiosity and enthusiasm in the material. This is only feasible if they use activity-based learning and allow students to participate in mental and physical activities.

Recommendation

After focusing on my findings and conclusions, I would like to offer the following suggestion to enhance the design and implementation of the development and its impact on elementary school kids' performance.

1. The instructor should focus on organizing, directing, facilitating, monitoring, demonstrating, evaluating, and sustaining the classroom environment.
2. Activities must to be tailored to the cognitive capacities of students from various backgrounds.
3. Group learning and the planning of various activities should foster student initiative and participation.
4. To ensure that every student is actively participating in class activities, the teacher should provide direct or indirect guidance.

5. Through pre-service and in-service training, teachers must acquire the information and abilities necessary to adopt an activity-based approach in the classroom. A training program could be created in this context.
6. Using real-world scenarios in the classroom has been shown to be a successful strategy for fostering students' problem-solving skills.
7. Activity-based learning in the classroom should be encouraged by the government.
8. An activity-based learning strategy increases student engagement and makes instruction and learning more pleasurable, as well as simpler to comprehend and implement.