Effect Of Active Learning On Students' Attitude Towards Science At Elementary Level

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Abstract

The study intends to investigate how active learning affects the attitudes of elementary students towards science. More concretely, the inquiry was underpinned by a single research objective and corresponding hypotheses. The first goal was to determine the impact of active learning strategies at the elementary level on students' attitudes toward science. The study was held at public schools in District Lahore. The target population included 296 schools in the district. In order to accomplish the set objective, a sample of 25 students in seventh grade was selected. The students were exposed to quantitative data, which were collected through a questionnaire and an achievement test, both designed for this study by the researcher. The chosen research design was experimental, the A-B-A method, while the intact group was selected as the sample group. The key assumption of the study was that students would experience a positive attitude toward active learning methodologies. The research was conducted to determine any changes or trends in students' science attitude by implementing the active learning strategies. Thus, using the real-world scenario of elementary students' education, the study aimed to contribute to the insights regarding the application of active learning in the science field.

Keywords: *Active Learning, Students' Attitude, Science Learning*

1. Introduction

The purpose of this paper is to investigate the influence of active learning on elementary students' attitudes towards science. Through assessing the efficacy of a number of interactive approaches to teaching, this study seeks to prove that active learning can increase student interest and satisfaction

with science teaching and learning. Over the past thirty years, there has been a huge push for better training in science at the elementary level. Instruction is traditionally based on passive learning methods, in which students listen to lectures and remember details, but a research shows that it does not work well for the full-time student to develop a real interest and the right empirical preconception of scientific ideas (Felder & Brent, 2024).

The issue of student engagement and motivation has been the focus of previous research into factors that contribute to students' academic achievement, especially in STEM disciplines. Active learning, which entails practical activities, group work, and problem-solving, can be viewed as a solution to this issue. Active learning allows the classroom to adopt a laboratory environment in which students actively learn and encourage deeper learning and attitude toward science through participation (Bridges et al., 2020).

There is an existing research tradition that explores the advantages of active learning for undergraduate and postgraduate students, but the topic is underexplored in elementary education. It is important to uncover how active instructional methodologies can contribute to shaping students' perceptions of science at an early age to provide more effective curricular solutions and teaching approaches in primary schools (Wulandari & Wulandari, 2013).

This research contributes to the existing literature by providing empirical evidence of the effectiveness of active learning in shaping elementary students' attitudes towards science. By elucidating the mechanisms through which interactive teaching methods impact student perceptions, this study offers insights that can inform educators, policymakers, and curriculum

developers in promoting science education that is engaging, inclusive, and effective (Lumpkin et al., 2015).

The decision to explore the impact of active learning on the attitudes of elementary students toward science is primary rooted in the continued recognition of the primacy and vital roles played by early exposure and experience in determination of long-term attitudes and professional interests in STEM fields. By explaining the merits of the use of active learning techniques to facilitate the teaching of science in elementary grades, this study will place the power of transformative and inspirational practices in the hands of educators to drive the realization of future generations of scientists and innovators (Partin et al., 2013).

3. Significance of the Study

The research "Effect of Active Learning on Students' Attitude Towards Science at Elementary Level" has significant importance in the field of education, as it significantly impacts the course of science instruction taught to children at a young age. In essence, this study seeks to improve the quality of science education at the elementary level, where children establish the building blocks of their academic career. For this reason, by exploring the implications of active learning methods, the research attempts to innovate traditional pedagogical practices to make science more interesting, relevant, and exciting for young learners in primary grades. As a result, the study also has profound implications for educational practice by answering a pressing question about the current state of science studies. Given that interest in science by students' wanes as they move through the schools, active learning interventions can reverse this trend and demonstrate that students enjoy studying the subject once more (Lorenzo et al., 2019). Finally, the results of the

study can support the broader agenda of strengthening the ability to learn without a specific deadline throughout life and promoting justice and inclusion in education. The focus on guiding educational activities and learning arrangements enables the broader impact this study could have on the future of science education, ensuring that students at all levels receive the opportunity to build a positive relationship with science as early as possible.

1. **Objectives of the Study**

   The study's research objective was to:

   1. Find the impact of active learning at elementary level on the student's attitude towards science.

   2. Hypotheses of the Study

To achieve the goals, the following null hypotheses were established in the light of research objective.

H_{01}: There is no major impact of active learning at the elementary level on the attitude of the students towards science.

3. Review of Literature

It is evident that the importance of developing positive attitudes towards science education at the elementary level cannot be overemphasized. By developing strong science backgrounds during their formative years, elementary students get better situated for their future academic life and develop a belief in science and the need for scientific inquiries in various aspects of their lives. Active learning, which involves an inclusive approach and encourages hands-on experiences, is a

transformative pedagogical method to help improve student attitudes to science. In this light, this review attempts to Review the literature available on the effects of active learning on elementary students' attitudes for more informed decisions (Brame & Biel, 2023).

4. Active Learning and Attitude Formation

Active learning encompasses a wide range of innovative methodologies; it involves inquiry-based learning, project-based learning, collaborative learning, and experiential learning. All these strategies put the students at the center and encourage their direct involvement and interaction, hoping that science-related curiosity, critical thinking, and problem-solving skills will then influence positive science attitude dimension. Evidence suggests that active learning is significantly associated with interest in, enjoyment of, confidence in, and perceived competence in science among children in elementary school (Haak et al., 2022).

5. Engagement and Motivation

Engagement and motivation affect students' attitudes about science. Non-passive learning settings allow students to experience first-hand experiments and manipulate equipment, fostering motivation and engagement in the learning process. According to a researcher, "students interest and curiosity would be jogged if they are actively involved in the learning process". Therefore, it follows that active involvement would improve students' attitudes towards the subject (Carr et al., 2021).

6. Constructivist Learning Theory

The constructivist theory suggests that students construct knowledge by experiencing and interacting with the environment. Active learning is based on the constructivist ideas of the students creating meaning on their own by exploring and experimenting. The Vygotsky ZPD emphasized the significance of scaffolding and cooperation in learning attainment. Tiny differences, for example, may be built using cooperative group work and problem-based learning. These methods encourage discussion and debate and support scaffolding. Hence, attitude towards positive science is encouraged (Johnson & McCoy, 2011).

7. Teacher Practices and Classroom Climate

Finally, the role of teachers and the classroom climate in student attitudes toward science are important to consider. Active learning is implemented well by strong facilitation, a supportive classroom climate, and substantial resources. Teacher training does provide a significant impact on teacher's abilities to carry out active learning. At the same time, a safe and open classroom climate that includes diverse expressions and opportunities for active, hands-on learning are ways to encourage positive attitudes towards science (Felder & Brent, 2024).

To conclude, the findings from the reviewed scholars indicate that active learning is a promising effective approach to increasing elementary students' attitudes towards science. This is because active learning methodologies promote engagement, motivation, and constructivist learning approaches, which are essential in promoting positive attitudes towards science among elementary students. Nonetheless, more research is needed to examine the long-term impact of active learning on students' attitudes, including its policy and practice implications for science education (Felder, 2007).

8. Methods and Procedures

This is the section that explains how was the research was done. Describes the steps that from the beginning to the end of the study, was referred to as theoretically through research methodology. The following steps were taken into consideration in executing this work. This study utilized a philosophical research paradigm in the framework of post-positivist science. It results in the application of such quantitative analytical methods. Essentially, this research paradigm is applicable in the framework of experimental work.

As for the study's general character, it can be noted that it was carried out as a quantitative research effort. More specifically, the research was an experiment that utilized the ABA research design. The research project had solely an intact group, meaning that the same group of participants was used throughout the experiment. There are also "three phases of the design: the baseline, intervention, and reversal". The baseline is when the data collection is carried out without an intervention. In the intervention phase, the researcher uses an intervention required for the study, while at the reversal phase, the intervention is removed, while data collection resumes. The experiment took 10 weeks, and the sessions took 45 minutes each. This structured the inquiry and enabled its assessment over time and regular intervals for the establishment of the intervention's effects.

9. Population of Study

The recent study refers to research regarding middle school students in the Lahore district. A review of the Department of School Education census for 2017 signifies that there are 296 public-sector schools at the basic level in District Lahore, which reveals an extensive distribution of the educational infrastructure in the district. It is possible that the research was concerned with various areas of school in the discussed schools, including demographic aspects of students, academic

achievement or performance, infrastructure, and even socio-economic aspects influencing the tendencies of education in the studied region. Since the study is designed for assessing middle school students, it might have been concentrated on the most formative years of learning and the especially vital phase of students' development regarding academic aspirations.

9.1. Sample of the Study

All participants of the study were chosen through their convenience in urban public schools in Lahore district. The research focused on the students at the elementary level. In elementary public schools, an average section or class comprises about 30 to 35 students. Hence, for this study, there was a 25 university-group of middle school children.

9.2. Instrumentation

The study was performed using two different methods, to conclude how active learning influences student's perceptions of science. Taken into account that, the tests used to examine the effect were created with reference to a table of specifications. The tests for both procedure was compiled according to the three levels of hierarchy in Bloom's Taxonomy. The test composition was matched with the conspectus of the 7th-grade subject General Science; this ensured an equally distributed representation of knowledge, the understanding in defense of some kind and comprehension, application levels.

The research consisted of three phases according to the ABA model in which each phase runs the tests. The intervention phase was followed by the tests, and then it was repeated to measure whether the intervention phase sustained the effects. Hence there were six tests that were carried out, and their scores were used to develop the difference with each test. The types of questions used in academic achievement included multiple-choice, short-answer and long answer questions. The tests have been attached for references.

The feedback by the experts, including the subject specialists, is critical in enhancing the validity of the test instrument. As such, the feedback provided by the experts on the suitability and the quality of the test instrument was received and the recommendations were used in the tests. The second instrument was a questionnaire to measure the students' attitude change. The questionnaire contained twenty statements that used a five-point Likert scale. The validity of the instrument was provided by the research supervisor; in the appendix, the validity report is provided for review.

9.3. Data Analysis

Visit to the school to obtain the data was made by the researcher himself. The school head provided formal permission, and confirmed by way of letter, that included assurance that the research study would cause no harm to the mental or the physical well-being of the participants. Preservation of the introduced information from spread and avoiding improper work with the results are essential. The data was studied with the help of relevant statistical methods: descriptive statistics included measures of central tendency, frequency, standard deviation and inferential statistics, including paired sample t-test.

10. Data Analysis for Attitude towards Active Learning

H_o1. There is no significant consequence of active learning on students' attitude about science at elementary school level.

Frequency Distribution and Mean Scores of the Answers in Questionnaire on Scale Items

Table 1

Frequency Distribution of Answers on Scale Items and Descriptive Statistics of Pre-Test

No.	Statements	SD	DA	N	A	SA
1	The definitions of groups are easily understandable for me.	6	10	6	1	2
2	Study actively is more important as compare to taking regular classes.	5	9	7	1	1

3	I usually assist my friends in learning tasks.	7	11	6	1	0
4	My active participation in classroom benefits me during learning.	6	9	5	3	2
5	Active participations in classroom activities also helps me to get better grades.	4	12	7	1	1
6	I usually remain interested in all the activities during class.	5	9	8	1	0
7	Activities made learning active.	4	12	8	1	0
8	Active learner enable me to learn in better way.	6	10	6	1	2
9	I usually enjoy a lot during the active learning process.	5	9	7	1	1
10	If teacher uses active learning methodology I learn at my best.	7	11	6	1	0
11	My active learning enables me to seek better when I engage with other students	5	10	5	3	2
12	Active learning enhance my memory.	5	9	8	1	0
13	While working with others I develop my social skills e.g. it enhance my communication and class relationship.	4	12	8	1	0
14	If I pose a question about the lesson, my instructor reassured me.	6	10	6	1	2
15	Question answers during class enables me to learn difficult science concepts.	5	9	7	1	1
16	I develop deeper understanding of course after discussing it with my peers.	7	11	6	1	0
17	My participation in classroom activities enables me perform better in class.	6	9	5	3	2
18	In my science course work, I check with my instructor and classmate when I face a difficult problem.	4	12	7	1	1
19	Demonstration of science concept also enables me to understand the concept in a better way.	5	11	6	3	0
20	Digital devices, AV Aids during demonstration also helps me in the better understanding of concepts.	6	13	5	0	1

(N = 25)

The presented table shows distribution of the responses to the scale items in pre-test. Thus, 25 respondents made evaluations as follows: 6 strongly disagreed, 10 disagreed, 6 neutral, 1 agreed, and 2 strongly agreed to initial statement. This overview clearly shows the spread of responses in the selected sample. Concerning the second assertion, the results for the 25 respondents were 5 strongly disagreed, 14 disagreed, 5 neutral, and 1 agree to the statement. In

other words, the distribution of respondent's opinion on the second statement is also diverse. Moreover, in Table 4.3, mean score for each item of the scale is provided as a quantitative overview of the data.

Table 2

Frequency Distribution of Answers on Scale Items and Descriptive Statistics of Post-Test

No.	Statements	SD	DA	N	A	SA
1	The definitions of groups are easily understandable for me.	0	7	4	6	8
2	Study actively is more important as compare to taking regular classes.	1	1	7	5	9
3	I usually assist my friends in learning tasks.	1	0	6	7	11
4	My active participation in classroom benefits me during learning.	3	2	5	6	9
5	Active participations in classroom activities also helps me to get better grades.	1	1	7	4	12
6	I usually remain interested in all the activities during class.	1	0	8	5	9
7	Activities made learning active.	1	0	8	4	12
8	Active learner enable me to learn in better way.	1	2	6	6	10
9	I usually enjoy a lot during the active learning process.	1	1	7	5	9
10	If teacher uses active learning methodology I learn at my best.	1	0	6	7	11
11	My active learning enables me to seek better when I engage with other students	3	2	5	5	10
12	Active learning enhance my memory.	1	0	8	5	9
13	While working with others I develop my social skills e.g. it enhance my communication and class relationship.	1	0	8	4	12
14	If I pose a question about the lesson, my instructor reassured me.	1	2	6	6	10
15	Question answers during class enables me to learn difficult science concepts.	1	1	7	5	9
16	I develop deeper understanding of course after discussing it with my peers.	1	0	6	7	11
17	My participation in classroom activities enables me perform better in class.	2	3	5	6	9
18	In my science course work, I check with my instructor and classmate when I face a difficult problem.	1	1	7	4	12

19	Demonstration of science concept also enables me to understand the concept in a better way.	1	2	6	5	11
20	Digital devices, AV Aids during demonstration also helps me in the better understanding of concepts.	0	1	5	6	13

(N= 25)

Table 4.3 above provides the distribution of the responses in post-test over the rating levels. For example, with regard to the first statement, 25 respondents strongly disagreed 0 on the issue, 7 disagreed, 4 were neutral, 6 agreed, and 8 strongly agreed. In the second argument, 25 strongly disagreed 1, 1 disagreed, 7 were neutral, 5 agreed, and 9 strongly agreed. The table 4.3 above also indicates the average score for the scale item.

Table 3

Mean Scores of Answers on Scale Items and Descriptive Statistics of Pre-test

No.	Statements	Mean	*SD*
1	The definitions of groups are easily understandable for me.	2.07	0.88
2	Study actively is more important as compare to taking regular classes.	2.27	0.78
3	I usually assist my friends in learning tasks.	2.27	0.81
4	My active participation in classroom benefits me during learning.	2.35	0.80
5	Active participations in classroom activities also helps me to get better grades.	2.15	0.83
6	I usually remain interested in all the activities during class.	2.25	0.58
7	Activities made learning active.	2.27	0.81
8	Active learner enable me to learn in better way.	2.45	0.67
9	I usually enjoy a lot during the active learning process.	2.37	0.89
10	If teacher uses active learning methodology I learn at my best.	2.50	0.81
11	My active learning enables me to seek better when I engage with other students	2.35	0.76
12	Active learning enhance my memory.	2.55	0.71
13	While working with others I develop my social skills e.g. it enhance my communication and class relationship.	2.52	0.84
14	If I pose a question about the lesson, my instructor reassured me.	2.67	0.76
15	Question answers during class enables me to learn difficult science concepts.	2.47	0.87
16	I develop deeper understanding of course after discussing it with my peers.	2.37	0.77

17	My participation in classroom activities enables me perform better in class.	2.35	0.73
18	In my science course work, I check with my instructor and classmate when I face a difficult problem.	2.47	0.84
19	Demonstration of science concept also enables me to understand the concept in a better way.	2.35	0.76
20	Digital devices, AV Aids during demonstration also helps me in the better understanding of concepts.	2.40	0.84

(N = 25)

Table 2 above shows the mean scores of the responses on the scale items for the pre-test phase. For example, in the first statement, 6 out of 25 respondents strongly disagreed, 10 disagreed, 6 were neutral, 1 agreed, while 2 strongly agreed. The scale item mean is 2.07 and has a standard deviation of 0.88. In the 2 nd statement, 5 respondents strongly disagreed, 14 disagreed, 5 were neutral, and 1 accepted.

The average value based on the statements of this criterion is 2.27, with a standard deviation of 0.78. The mean value of each statement varied from 2.07 to 2.67, and the standard deviation was from 0.71 to 0.89. Special attention should be paid to the last indicator, as the average value for statement number 14 was 2.67, while statement number 9 was the lowest in terms of standard deviation among all statements and equal to 0.89. The average value of all indicators was below average. Thus, one can assume a lower overall attitude to successful pre-test learning.

Table 4

Mean Scores of Answers on Scale Items and Descriptive Statistics of Post-test

Sr. No.	Statements	Mean	*SD*
1	The definitions of groups are easily understandable for me.	3.47	1.03
2	Study actively is more important as compare to taking regular classes.	3.92	0.72
3	I usually assist my friends in learning tasks.	4.05	0.67
4	My active participation in classroom benefits me during learning.	4.07	0.76

5	Active participations in classroom activities also helps me to get better grades.	3.92	0.85
6	I usually remain interested in all the activities during class.	4.10	0.70
7	Activities made learning active.	4.35	0.69
8	Active learner enable me to learn in better way.	4.15	0.66
9	I usually enjoy a lot during the active learning process.	4.20	0.79
10	If teacher uses active learning methodology I learn at my best.	4.07	0.69
11	My active learning enables me to seek better when I engage with other students	4.12	0.82
12	Active learning enhance my memory.	4.02	0.86
13	While working with others I develop my social skills e.g. it enhance my communication and class relationship.	4.12	0.75
14	If I pose a question about the lesson, my instructor reassured me.	4.25	0.77
15	Question answers during class enables me to learn difficult science concepts.	4.10	0.92
16	I develop deeper understanding of course after discussing it with my peers.	4.07	0.79
17	My participation in classroom activities enables me perform better in class.	4.25	0.63
18	In my science course work, I check with my instructor and classmate when I face a difficult problem.	4.30	0.60
19	Demonstration of science concept also enables me to understand the concept in a better way.	4.02	0.73
20	Digital devices, AV Aids during demonstration also helps me in the better understanding of concepts.	4.15	0.69

(N = 25)

In the table above, you will find the post-test scores to which the respondents reacted positively or negatively. Here are the details, for example, the first statement has 0 strong disagreements, 4 Disagreement, while 7 were neutral 6 decisions, and 8 strong decisions. The standard deviation is 1.03, and the mean score is 3.47. The second alternative has 0 strong disagreements and 1 Disagreement. There are 6 neutral scores, 10 decision scores, and 8 strong decisions. This breakdown gives fine details on how different people responded to the different statements presented, providing a clearer picture of the sentimentality of the participants.

The component that is measured by the Active Learning scale demonstrates a strong mean score of 3.92 with a standard deviation of.72. The mean scores across the statements are in the range from 3.47 to 4.35, which indicates the high variability of responses. Similarly, the standard deviation varies greatly, from.60 to 1.03 across the statements. The statement that catches the eye with the highest mean value of 2 at 4.35, which suggests that there is a high level of agreement or positivity regarding the concept being measured among students. On the other hand, statement number 1 depicts the lowest value of the standard deviation, 1.03, which indicates a relative consistency of responses among the respondents. The post-test results indicate that the mean scores are consistently higher than the average, which shows that students have a prominent positive attitude towards active learning. This fact implies that students are highly receptive and involved in the active learning approach as a method.

Table 5

Difference in Mean Scores of Pre-test & Post-test

Variables	N	Mean	*SD*	*t-value*	*Df*	*P*
Total Pre-Score	25	12.5	2.74	19.0	24	0.04
Total Post-Score	25	10.9	3.38			

A paired-sample t-test was run to determine the influence of active learning on the attitude of elementary students about science. The number of respondents was a total of 25. The mean attitude score before the study was 27.5, with a standard deviation of 9.35. After active learning program, the mean attitude score was as high as 49.9, with a standard deviation of 7.98. The t- value was 19 with the degrees of freedom = 39. The findings showed a significant effect of the intervention $p < 0.05$) two-tailed. As a result, the mean difference in attitude scores from before and after study was 22.4 with a 95% confidence interval. The eta squared statistics as an effect size assessment was 0.90, which is large based on Cohen's 1988 criteria.

In this regard, a pair-sample t-test was employed and showed the significant impact of active learning on students' attitudes towards science at the elementary level. A total of 25 students were involved in the study. A mean score of attitude before the intervention was 27.5, with a deviation of 9.34. In comparison, after carrying out the active learning, a mean score at post-test was 49.9 and a deviation of 7.98. It should be noted that the t-value was 19.0, which reveals a significant impact of active learning on the students' attitudes towards science, t df = 19. 0 (39, $p < 0.05$, two-tailed). After that, the mean score decrease was 22.4 with a 95 % CI. Therefore, this drop is quite significant and indicates the change in students' conditions after the intervention. Moreover, the magnitude of the effect was calculated using the eta squared: $\eta^2 = 0.90$. Therefore, the effect size is large, as suggested by Cohen 1988. Thus, active learning significantly affected the improvement of students' attitudes towards science at the elementary level.

11. Discussion & Findings of the Study

P-value analysis one rejects the null hypothesis, which means that there is no significant impact of active learning on the academic performance of elementary school students. This is because the average scores obtained from both assessments revealed a prominent influence.

The findings of the study indicated a significant difference in the average post-intervention attitude scores of the group of students taught science through active learning techniques at the beginning of the study with their pre-intervention attitude while they earlier taught the science through conventional methods. This is evident that the intervention significantly influenced the student attitude against science. There was a clear observation of students' behavior modality contingent to science throughout the intervention. However, there is a need to acknowledge that there existed no significant difference in the student attitude towards science based on the baseline period of the intervention while the students were still taught the science through the convention

methods. This is a clear indication that the active learning techniques had a positive influence on the student attitude. This statement covers utilization of active learning approach in science education as an effective strategy and its impact on students' attitude towards science. The fact that this concept is supported by references to data from various studies demonstrates that this trend is constant. It states that using active learning methods contributes to positive self-expectation in the learning of science. Indeed, previous research studies had found a similar trend. (Akpınar et al., 2022) echoed this study's sentiments from evidence supporting active learning that resulted in improved attitude toward science education. (Brame & Biel, 2023) similarly discovered that active learning had a positive impact on the attitudes of graduate students toward the lectures to be taught and thus should be incorporated into higher education. In a related development, (Carr et al., 2021) concurred that active learning with web-based applications positively affected attitude to acting teachers and revealed better attitude towards lesson planning and presentation. (Bridges et al., 2020) findings also support maintaining a good attitude in students towards studying science using active learning. All of them agree active learning works miracles to maintain a good attitude towards Sciences among students.

These and other observations corroborate the study of (Haak et al., 2022), which indicates that students generally aspire to study science. At the same time, they worry about the complexity of this subject, believing that they do not have enough time to master it. (Haak et al., 2022) emphasizes that the anxiety felt by students subsides during interactive lessons when the atmosphere is less intensive, and they can better learn the new information. Another critical source for this study is the research by (Lorenzo et al., 2019); the researchers found that constructive thinking, innovative thinking, commitment, and dynamic learning change. These phenomena are the negative attitude toward lessons in school to a positive one. Therefore, creating a supportive

atmosphere during the lesson, promoting greater interaction, appears a promising area for improving the students' perception of the science subject. The results of this research differ from several previous literature works. (Lumpkin et al., 2015) established that, the difference in the attitude was non-significant between the lesson groups. In particular, it was found that the influence of the active learning method and the traditional teaching method on the students was not determined by the varying attitude towards the science course. At the same time, the research team stated that the implementation of the active learning approach significantly affected the students' attitude toward the science subject itself. Again, the current research is exploratory, and the attitude toward science lessons may vary between the different schools. Second, the influence on behavior can be studied in other grades and educational content. Third, the active learning method can be used to other components and content of the science education field.

12. Conclusion

The researchers also used ANOVA to analyze the effect of active learning on attitudes of science of the middle school pupils. Results of the experiment indicated that there was difference in the attitude of students learning through active method from the elementary schools in the whole district of Lahore. The researchers also analyzed the relationship between active learning and the academic performance of the pupils in elementary level of schools in Lahore district. The experiment findings indicated that all through the phase of the experiment, there has then been significant differences in the attitudes levels of the elementary pupils from Lahore district. Besides, researchers conducted a frequency analysis, in efforts to determine the effect of active learning on either attitude of the students or academic club performance.

In conclusion, the research sought to determine differences in the attitudes towards science, the dependent variable, among elementary students. Applying a paired sample t-test to the students'

data revealed the presence of statistically significant differences in attitudes. The anticipated assumption to be tested was that the students in the experimental group would manifest a better attitude to science upon their active involvement in the learning process.

13. Recommendations

Following guidelines, findings were drafted:

1) Administrators should encourage and facilitate the integration of audio-visual aids into the standard teaching practice. The facilitation may take the form of workshops, training sessions, or direct provision of the necessary equipment and resources.
2) School administrators should provide regular training and development sessions to teachers to help them acquire necessary skills around developing and using audio-visual aids. For example, short courses on common multimedia software, presentation skills, or even understanding student learning styles.
3) School administrators should also foster a supportive and empowering teaching environment whereby teachers are not afraid to experiment with different tools and get judged. The administration should support innovation, especially in instructional methods.
4) Teachers should also receive course training and encouragement to learn how to pay attention to students during teaching sessions. Regular feedback and adjustments in instructional techniques are necessary to maintain engagement and understanding.
5) School administrators also need to ensure teachers have all the necessary resources to create and use audio-visual aids. The resources may include funding to purchase equipment, licenses to access software, and technical assistance.

6) Collaborating with other teachers on how to use audio-visual aids can help pass best practice tips to others. Suggest the development of a platform or a forum where teachers can regularly meet to improve instructional techniques.

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