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Impact of Activity-Based Learning on Environmental Studies Achievement among Class III Students in Churchandpur District, Manipur

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ABSTRACT

This study examines the impact of Activity-Based Learning (ABL) on Environmental Studies (EVS) achievement among Class III students in Churchandpur District, Manipur. Recognizing the limitations of traditional rote-based teaching methods, the research explores how ABL can address the declining performance in EVS, as highlighted by the National Achievement Survey (NAS). A participatory action research framework was employed, involving 82 students from Tuibong High School, using pre-test and post-test designs to evaluate changes in achievement. The study focused on two competencies: understanding food and water requirements and observing game rules. Results indicated significant improvement in both competencies post-intervention, with paired-sample t-tests confirming statistically significant differences ($p < 0.05$). The intervention yielded gender-neutral outcomes, suggesting that ABL fosters equitable learning environments. Qualitative data from open-ended responses and teacher observations further

emphasized increased student engagement, motivation, and critical thinking. The findings underscore ABL's transformative potential in enhancing EVS education by making abstract environmental concepts tangible through hands-on activities like nature walks, waste segregation, and water testing. Beyond improving cognitive outcomes, ABL nurtured pro-environmental attitudes among students, equipping them with essential skills to tackle environmental challenges. This research supports integrating ABL into EVS curricula, advocating for policy reforms to promote experiential learning. The study contributes to addressing learning disparities in rural settings, emphasizing the role of innovative pedagogies in fostering environmental stewardship and sustainable development in primary education.

1 Introduction

Environmental Studies (EVS) plays a critical role in primary education by fostering the development of environmentally conscious individuals. As the world faces escalating ecological challenges, the need for innovative teaching approaches that go beyond traditional rote-learning methods has become evident. These conventional methods often fail to generate genuine interest or a deep understanding of environmental concepts among students. In response, this study investigates how Activity-Based Learning (ABL) can bridge these gaps and enhance the quality of EVS education. The primary stage of education is a crucial phase for shaping cognitive and emotional development, making it an opportune time to introduce innovative methodologies like ABL. This approach strengthens the bond between learners and their natural environment, fostering a heightened sense of responsibility for environmental stewardship.

The Churchandpur district in Manipur, renowned for its rich biodiversity and vibrant ecosystems, is also grappling with significant environmental issues such as deforestation, soil erosion, and water scarcity. These challenges highlight the urgent need for robust environmental education at the foundational level to prepare future generations to address such issues effectively. ABL is a promising solution that offers a student-centred, hands-on approach that fosters meaningful cognitive and emotional connections with environmental topics.

ABL employs interactive activities such as nature walks, waste segregation, and water testing to create an engaging learning environment. This method aims to enhance students' motivation, critical thinking, and understanding of complex environmental concepts. Unlike traditional instruction, ABL encourages students to explore, discover, and apply their knowledge practically, making abstract concepts tangible and relatable.

This study aims to bridge the gap between traditional teaching methods and the pressing need for practical environmental education. By providing evidence of ABL's potential to transform EVS education, it lays the groundwork for reforms in policy and practice, particularly in regions like Manipur. The ultimate goal is to establish a sustainable experiential learning model that empowers primary school students to become proactive custodians of their environment.

This research adopts a participatory action research framework involving 82 students studying in class III from Tuibong High School in Churchandpur. Using a pre-test-post-test design, the study employs quantitative and qualitative methods to assess ABL's impact on student outcomes. This dual approach ensures a comprehensive understanding of how ABL influences student learning, engagement, and attitudes toward the environment. Moreover, the study seeks to address disparities highlighted in the National Achievement Survey (NAS), which identifies significant gaps in student performance in rural contexts like Churchandpur.

The findings of this research hold significant implications for educational reform. By demonstrating the effectiveness of ABL in enhancing student outcomes, this study supports the integration of activity-based methods into the EVS curriculum. It aligns with global education trends emphasizing experiential learning to achieve sustainability goals and develop environmentally responsible citizens. By nurturing ecological awareness and critical thinking skills early, ABL equips students to actively contribute to solving environmental challenges.

1.1 Statement of the Problem:

The study, *"An Action Research on Activity-Based Learning in Environmental Studies at the Primary Stage in Churchandpur District, Manipur,"* explores the decline in performance of Class III students in Environmental Studies (EVS) within Churchandpur district, as reflected in the National Achievement Survey (NAS) results between 2017 and 2021. Although the average scores for EVS in Churchandpur were higher than the state and national averages in both years, the study seeks to address the learning gap evident in the decline, particularly in two key competencies:

- Understanding the need for food for different age groups and animals, the availability of food and water, and water use in homes and surroundings.
- Understanding the rules of games (indoor, local, and outdoor).

1.2 Question of the Study:

The major research questions of this study are:

i. Is there a significant difference in achievement in Environmental Studies (EVS) on Competency 1 between the pre-test and the post-test?
ii. Is there a significant difference in achievement in EVS on Competency 2 between the pre-test and the post-test?
iii. Is there a significant difference in pre-test overall achievement in EVS between boys and girls?
iv. Is there a significant difference in post-test overall achievement in EVS between boys and girls?
v. Is there a significant difference in overall achievement in EVS between Competency 1 and Competency 2?

1.3 Objectives of the Study:

The objectives of the present study are:

i. To analyse the difference in achievement levels in Environmental Studies (EVS) on Competency 1 between the pre-test and the post-test.
ii. To examine the difference in EVS achievement on Competency 2 between the pre-test and the post-test.
iii. To compare the pre-test overall achievement in EVS between boys and girls.
iv. To investigate the difference in post-test overall achievement in EVS between boys and girls.
v. To assess the overall difference in achievement in EVS between Competency 1 and Competency 2.

1.4 The Rationale of the Study

This study addresses the evident gaps in Environmental Studies (EVS) learning outcomes among Class III students in Churchandpur district, Manipur, as revealed by the National Achievement Survey (NAS) reports of 2017 and 2021. These reports underscore disparities in performance across demographics and specific learning outcomes (LOs), highlighting the need for targeted educational interventions.

In 2017, the overall EVS average score in Churchandpur was 66.88%, exceeding the state average (63%) and the national average (58%). Girls (70.57%) outperformed boys (63.66%), indicating a noticeable gender gap. Variations were also observed across social groups, with the General category scoring the highest (76%), followed by SC (68.99%), OBC (66.45%), and ST (64.65%). Specific challenges emerged in key LOs, such as observing game rules, with an average score of 42.33%, significantly below the state (60%) and national (58%) averages. Despite these gaps, the district excelled in recognizing good/bad touch, addressing stereotypes, and understanding food and water usage.

The 2021 NAS report reflected a decline in EVS performance, with an overall district average of 59%, falling below the state average (62%) and marginally above the national average (57%). While girls (51.6%) continued outperforming boys (48.3%), the gender gap persisted. Social group performance rankings shifted, with OBC students scoring the highest (77%), followed by SC (62%), ST (59%), and General category students (54%). Many LOs, including map reading and predicting patterns, showed continued underperformance (NAS, 2017, 2021).

These findings underscore the limitations of traditional rote-based teaching methods, which often fail to engage students effectively or connect abstract concepts with real-life applications. The persistent gaps in critical LOs reveal the need for innovative, student-centred pedagogical approaches.

This study proposes Activity-Based Learning (ABL) to address these gaps. ABL emphasizes hands-on, participatory learning, encouraging exploration and discovery. The study aims to enhance students' understanding, interest, and motivation by implementing ABL in EVS education. This approach addresses learning gaps and fosters critical thinking, problem-solving, and environmental stewardship.

The research seeks to contribute to sustainable educational practices in resource-constrained settings, emphasizing the potential of ABL to transform EVS learning outcomes in the Churchandpur district and beyond. By equipping students with the skills to engage with environmental challenges meaningfully, the study aspires to cultivate a generation of environmentally conscious citizens.

2 Review of Related Literature

Activity-Based Learning (ABL) has gained recognition as an effective pedagogical approach, particularly in Environmental Studies (EVS). Its emphasis on student engagement through experiential learning fosters critical thinking and pro-environmental attitudes. Several studies underscore its positive impact on academic achievement and behavioural outcomes, making it especially relevant in contexts like Manipur. The Study by **Bhadra (2010)** reported significant improvements in environmental awareness among students in rural West Bengal following ABL interventions. Similar findings have been observed in Tamil Nadu, Kerala, and Maharashtra, illustrating ABL's adaptability across diverse regions in India.

Internationally, research corroborates these findings. **Ernst (2007)**, in an action research study conducted in the United States, demonstrated how ABL promotes environmental literacy, problem-solving, and stewardship among students. Recent studies by **H., H., Yolcu (2023)** affirm its cognitive benefits, particularly in enhancing the retention and application of environmental concepts. Similarly, **Stella et al. (2023)** emphasized its positive effects on skills such as recall, comprehension, and application in Science and Technology education. Additional research has suggested that ABL can improve students' attention spans, concentration, and overall interest in learning. Longitudinal studies have shown the method's effectiveness in helping students connect environmental concepts, thereby enriching their ontological perspectives.

Several studies have examined the impact of ABL on student achievement across various subjects, including environmental studies. Research findings affirm the efficacy of ABL in improving student outcomes. **Anwer (2019)** concluded that activity-based pedagogy significantly enhances student motivation and academic performance. Similarly, **Çelik (2018)** demonstrated marked improvements in achievement and attitudes toward mathematics among sixth-grade students due to ABL. In science education, **Khan et al. (2012)** reported positive impacts on secondary students' achievement in Physics.

Another research study suggests that ABL is particularly beneficial for young learners. In contrast, **Biazak et al. (2010)** demonstrated how ABL improved memory retention among preschoolers. Similarly, **Albadi and David (2019)** reported that ABL significantly improved 12th-grade students' achievement in science and environmental subjects.

However, implementing ABL in resource-constrained environments presents challenges. Limited access to materials, time constraints, and teacher training are common barriers. Safety concerns, environmental degradation, and teachers' preference for lecture-based methods due to unfamiliarity with

ABL further hinder its adoption. **Chacko (2004)**, in a study conducted in rural Assam, identified shortages of learning aids and large class sizes as critical challenges. In contrast, **Kaur-Gill and Kaur-Dhindsa (2012)** demonstrated how strong leadership and community collaboration could effectively overcome infrastructural limitations, emphasizing the importance of context-specific solutions. The accumulated literature consistently indicates that ABL holds considerable promise for enriching EVS education by promoting active learning, critical thinking, and pro-environmental behaviours. This comprehensive review advocates investigating the challenges and opportunities associated with implementing ABL, specifically within the context of the Churchandpur District. This research aims to enhance EVS performance through community-engaged interventions and professional development for teachers.

In conclusion, the literature review confirms that ABL is a highly effective approach for enhancing student achievement across different subjects and age groups. Specifically, within environmental education, ABL has been shown to positively affect students' knowledge, attitudes, and behaviours regarding the environment. The findings from these studies provide a strong rationale for implementing ABL in Environmental Studies for Class III students in the Churchandpur District of Manipur.

3 Methodology of the Study:

This study uses an action research approach with a pre-test-post-test design to evaluate the impact of activity-based learning on student outcomes. The methodology encompasses the sample and population selection, tools and techniques for data collection, and data analysis strategies, ensuring a comprehensive understanding of ABL's effects.

Sample and Population

The study examines 82 class III students from Tuibong High School, a government school in Churchandpur District, Manipur. The participants, comprising 40 boys and 42 girls, were selected using purposive sampling to ensure representativeness. The selection criteria focused on achieving a collaborative and diverse group, enabling gender-specific outcomes and overall performance analysis.

Table 1: Sample of the Study

Category of Class III Students from Tuibong High School, CCPur.		
Boys	Girls	Total
40	42	82

Tools and Techniques

Two main instruments were employed:

- **Questionnaires**: A self-made questionnaire modelled on the National Achievement Survey (NAS) framework was used. It comprised 30 multiple-choice questions equally divided between two competencies:
  - Need for food and water for different groups.
  - Rules of games (local, indoor, and outdoor). The questionnaires were administered as both pre-test and post-test to evaluate changes in students' knowledge and performance.
- **Qualitative Tools**: Open-ended questions captured students' perceptions of ABL activities, including their interest levels, motivation, and engagement. Teacher observations provided supplementary insights into classroom dynamics and student interactions during ABL lessons.
- **Teacher observations**: The researcher observed and noted students' behaviour and engagement during the activity-based learning lessons, including their participation, interaction, motivation, and challenges.

The validity of the questionnaire was reinforced through 5 expert reviews by local EVS educators. At the same time, the qualitative instruments offered nuanced perspectives on ABL's effectiveness.

Data Collection Process

The data collection spanned four weeks, from 5th April to 6th May, 2022. Key steps included:

1. **Pre-Test**: Administered on 5th April 2022. It served as a baseline for assessing students' initial competencies.

2. **Intervention**: The ABL methodology was introduced, focusing on hands-on, interactive learning. Activities included nature walks, waste segregation, water testing, and practical demonstrations. Teachers underwent prior training to ensure consistent implementation.
3. **Post-Test**: Conducted on 6th May 2022, the post-test mirrored the pre-test questionnaire in structure but randomized question order to control for bias.

Ethical considerations were rigorously observed, such as informed consent from participants and their guardians, confidentiality, and data anonymity.

Data Analysis

A mixed-methods approach was utilized:

1. **Quantitative Analysis**:
    - Scores from pre-test and post-test questionnaires were compared using paired-sample t-tests to evaluate the statistical significance of performance changes.
    - Gender-specific differences were analysed through two-sample t-tests, providing insights into performance disparities.
    - Descriptive statistics summarized overall trends and highlighted shifts in performance levels across competencies.
2. **Qualitative Analysis**:
    - Responses from open-ended questionnaires were thematically analysed to identify patterns in student experiences.
    - Observational data were synthesised to contextualize quantitative findings, offering a holistic view of ABL's impact on engagement and learning outcomes.

The triangulation of quantitative and qualitative data strengthened the study's reliability and validity. The findings informed educational practices, highlighting the transformative potential of ABL in enhancing EVS education for primary students in rural settings.

4 Results and Discussion:

4.1 First Question:

This analysis examines whether there is a significant difference in achievement levels in Environmental Studies (EVS) on Competency 1 between the pre-test and post-test. The results, as

presented in **Table 2** and **Table 3**, provide both descriptive and inferential statistics to address this question.

Table 2: Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean	Correlation	Sig.
Competency 1 (Pre-test)	7.579	82	2.8154	.3729	.423	.001
Competency 1 (Post-test)	10.509	82	2.5363	.3359		

The mean pre-test score for Competency 1 was **7.579,** with a standard deviation of **2.8154**. In contrast, the mean post-test score increased to **10.509** with a standard deviation **2.5363**. This improvement of approximately **2.93 points** suggests a noticeable enhancement in students' achievement after the intervention. The correlation between pre-test and post-test scores was calculated as **0.423**, indicating a moderate positive relationship, with a significance value of **0.001**, demonstrating that the correlation is statistically significant.

Table 3: Paired Samples t-Test

Pair 1	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
Competency 1 (Pre-test) - Competency 1 (Post-test)	-2.9298	2.8838	.3820	-7.670	81	.000

The paired samples t-test further validates the observed difference. The mean difference between pre-test and post-test scores was **-2.9298**, with a standard deviation of **2.8838** and a standard error mean of **0.3820**. The calculated t-value was **-7.670** with **81 degrees of freedom**, and the two-tailed p-value was **0.000**, far below the standard threshold of 0.05. This result indicates a statistically significant difference between the pre-test and post-test scores. After the intervention, the analysis demonstrates a significant improvement in students' performance in Competency 1 of EVS. The increase in mean scores from 7.579 to 10.509, coupled with strong statistical significance in the t-test results, suggests that the intervention positively impacted learning outcomes. The findings support the hypothesis that there is a

significant difference in achievement levels, highlighting the effectiveness of the instructional strategies or programs implemented. This evidence reinforces the need for such interventions to enhance student competencies in Environmental Studies.

4.2 Second Question:

This analysis aims to determine whether there is a significant difference in achievement in Environmental Studies (EVS) on Competency 2 between the pre-test and post-test. The data, as presented in **Table 4** and **Table 5**, provides descriptive and inferential insights into the observed differences.

Table 2: Paired Samples Statistics

Pair 1	Mean	N	Std. Deviation	Std. Error Mean	Correlation	Sig.
Competency 1 (Pre-test)	7.579	82	2.8154	.3729	.423	.001
Competency 1 (Post-test)	10.509	82	2.5363	.3359		

The mean score for Competency 2 in the pre-test was **7.386** with a standard deviation of **2.9384**, while the post-test means increased to **10.368** with a standard deviation of **2.3952**, reflecting a noticeable improvement of approximately **2.98 points** in student performance. The standard error mean for the pre-test and post-test scores were **0.3892** and **0.3172**, respectively, indicating the precision of the measurements. Additionally, the correlation between pre-test and post-test scores was **0.629**, which indicates a strong positive relationship, and the significance value was **0.000**, confirming the reliability of this correlation.

Table 3: Paired Samples t-Test

Pair 1	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
Competency 1 (Pre-test) - Competency 1 (Post-test)	-2.9298	2.8838	.3820	-7.670	81	.000

The paired samples t-test provided further evidence of a statistically significant difference. The mean difference between the pre-test and post-test scores was **-2.9825**, with a standard deviation of

2.3489 and a standard error mean of **0.3111**, suggesting consistent improvement across the sample. The calculated t-value was **-9.586** with **81 degrees of freedom**, and the two-tailed significance value was **0.000**, which is far below the 0.05 threshold, strongly supporting the rejection of the null hypothesis. The results indicate a significant improvement in students' achievement in Competency 2 of EVS from the pre-test to the post-test. The increase in mean scores, coupled with the strong positive correlation and highly significant t-test results, underscores the effectiveness of the intervention in enhancing student learning. These findings validate the second objective, demonstrating that the instructional approach or program implemented substantially impacted Competency 2 achievement in EVS. It supports the importance of targeted educational strategies to improve learning outcomes in environmental studies.

4.3 Third Question:

The third question seeks to determine whether a significant difference exists in pre-test overall Environmental Studies (EVS) achievement between boys and girls. The data, as shown in **Table 6** and **Table 7**, provides the necessary statistical evidence for this comparison.

Table 6: Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Overall Competency (Pre-test)	Girls	42	15.893	4.0400	.7635
	Boys	40	14.069	5.8550	1.0872

The mean pre-test score for girls was **15.893**, with a standard deviation of **4.0400**, and the mean for boys was **14.069**, with a standard deviation **5.8550**. It suggests that, on average, girls performed slightly better than boys in the pre-test. The standard error mean for girls was **0.7635**, while for boys, it was **1.0872**, indicating slightly less variability in the girls' scores than boys.

Table 7: Independent Samples Test

Overall Competency (Pre-test)	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	5.421	.024	1.364	80	.178	1.8239	1.3370

Equal variances are not assumed.			1.373	49.852	.176	1.8239	1.3285

The independent samples t-test was conducted to assess whether the difference in mean scores between boys and girls is statistically significant. Levene's test for equality of variances yielded an F-value of **5.421** with a significance value of **0.024**, indicating that equal variances cannot be assumed. Therefore, it is interpreted as "equal variances not assumed."

The t-test revealed a mean difference of **1.8239**, with a standard error difference of **1.3285**. The calculated t-value was **1.373**, and the two-tailed significance value was **0.176**, greater than the standard threshold of 0.05. It indicates that the observed difference in mean scores is not statistically significant between boys and girls. Although the mean pre-test scores suggest that girls performed better than boys in overall EVS achievement, the independent samples t-test confirms that this difference is not statistically significant ($p = 0.176$). The results imply that gender does not significantly impact pre-test performance in EVS, suggesting that other factors might influence achievement. These findings align with the objective and provide insight into the role of gender in academic performance in this context.

4.4 Fourth Question:

The fourth question examines whether there is a significant difference in post-test overall achievement in Environmental Studies (EVS) between boys and girls—data presented in **Table 8** and **Table 9** offer both descriptive and inferential statistics for this comparison.

Table 8: Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Overall Competency (Post-test)	Girls	42	21.321	4.3551	.8230
	Boys	40	20.448	4.8151	.8941

The mean post-test score for girls was **21.321**, with a standard deviation of **4.3551**, while boys scored a mean of **20.448**, with a standard deviation of **4.8151**. It indicates that girls performed slightly better than boys in the post-test. The standard error mean was **0.8230** for girls and **0.8941** for boys, suggesting comparable precision in estimating the mean scores for both groups.

Table 9: Independent Samples Test

Overall Competency (Post-test)	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	.180	.673	.717	55	.476	.8732	1.2174
Equal variances are not assumed.			.718	54.772	.476	.8732	1.2153

Levene's test for equality of variances yielded an F-value of **0.180** with a significance value of **0.673**, indicating that the variances are equal. Therefore, the row labeled "equal variances assumed" was used for the t-test interpretation.

The t-test revealed a mean difference of **0.8732**, with a standard error difference of **1.2174**. The t-value was **0.717**, with **55 degrees of freedom**, and the two-tailed significance value was **0.476**, more significant than the 0.05 threshold. It indicates that the difference in mean post-test scores between girls and boys is not statistically significant. The findings reveal no statistically significant difference in post-test overall achievement in EVS between boys and girls ($p = 0.476$), despite girls having a slightly higher mean score (21.321) compared to boys (20.448). The lack of significance suggests that the observed difference in performance is likely due to random variation rather than a systematic effect of gender. These results align with the objective, demonstrating that gender does not have a meaningful impact on EVS post-test achievement. This insight supports the view that the intervention or learning environment was equitable, enabling similar outcomes for both boys and girls in their overall EVS performance.

4.5 Fifth Question:

The fifth question seeks to determine whether there is a significant difference in overall achievement in Environmental Studies (EVS) between Competency 1 and Competency 2. The data provided in **Tables 10** and **11** allows for an analysis of this comparison through paired sample statistics and a paired t-test.

Table 10: Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean	Correlation	Sig.
Overall Competency (Pre-test)	14.965	82	5.0849	.6735	.582	.000
Overall Competency (Post-test)	20.877	57	4.5750	.6060		

The mean score for overall achievement in Competency 1 during the pre-test was **14.965**, with a standard deviation of **5.0849**. After the intervention, the mean score for Competency 2 (post-test) increased to **20.877**, with a standard deviation of **4.5750**, reflecting a mean difference of **5.9123**. The standard error mean for the pre-test was **0.6735**, and for the post-test, it was **0.6060**, showing consistency in the precision of the data. The correlation between the pre-test and post-test scores was **0.582**, with a significance value **0.000**, indicating a strong and statistically significant relationship between the two competencies.

Table 11: Paired Differences and t-Test

	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
Overall Competency (Pre-test) - Overall Competency (Post-test)	-5.9123	4.4412	.5883	-10.051	81	.000

The paired differences analysis revealed a mean difference of **-5.9123**, with a standard deviation of **4.4412** and a standard error mean of **0.5883**. The calculated t-value was **-10.051**, with **81 degrees of freedom**, and the two-tailed significance value was **0.000**, indicating a highly significant difference between the pre-test and post-test scores. The findings demonstrate a statistically significant improvement in overall EVS achievement between Competency 1 (pre-test) and Competency 2 (post-test). The increase in mean scores from **14.965** to **20.877**, coupled with the strong statistical significance ($p = 0.000$), underscores the effectiveness of the intervention in enhancing student performance. The results indicate a meaningful improvement in achievement, suggesting that the strategies or programs successfully fostered better learning outcomes in EVS. It aligns with the fifth objective, confirming a

significant difference in achievement levels between the two competencies, with a notable progression in student performance from the pre-test to the post-test.

5 Key Findings:

Key Findings of the study are:

i. **Significant Improvement in EVS Achievement**:
   - Post-test scores for Competency 1 (food and water need) increased from a mean of 7.579 (pre-test) to 10.509, reflecting a mean improvement of 2.93 points.
   - Competency 2 (rules of games) increased from a mean pre-test score of 7.386 to 10.368, with a mean improvement of 2.98 points.

ii. **Gender-Neutral Impact**:
   - Pre-test overall achievement showed girls scoring slightly higher (15.893) than boys (14.069), but the difference was statistically insignificant ($p = 0.176$).
   - Post-test overall scores were nearly equal, with girls scoring a mean of 21.321 and boys scoring 20.448. The gender difference was not statistically significant ($p = 0.476$).

iii. **Enhanced Cognitive Engagement and Motivation**:
   - Qualitative data from open-ended responses and teacher observations indicated that ABL fostered higher engagement levels, active participation, and interest among students.
   - Activities like nature walks, waste segregation, and water testing provided hands-on learning experiences, making abstract EVS concepts more relatable and practical.

iv. **Strong Correlation Between Competency Improvements**:
   - Both competencies' pre-test and post-test scores demonstrated a statistically significant correlation, with post-test achievements aligning strongly with the ABL intervention's goals.

v. **Addressing Learning Disparities**:
   - The intervention successfully addressed performance gaps noted in the NAS reports, particularly in rural settings where traditional rote learning methods dominated.
   - Improvement was observed in underperforming areas, such as observing game rules and understanding water and food needs.

vi. **Policy Implications**:

- The study provides evidence supporting the integration of ABL into EVS curricula, advocating for policy reforms to promote experiential learning in resource-constrained rural environments.

These findings highlight the effectiveness of ABL in transforming primary EVS education, fostering cognitive development, and nurturing environmental responsibility among students.

6 Suggestions and Recommendations:

Several actionable suggestions are proposed to enhance the effectiveness of Activity-Based Learning (ABL) in Environmental Studies (EVS).

- **Teachers and educators should incorporate ABL into regular curricula by designing modules aligned with EVS competencies, such as understanding food and water needs and observing game rul**es. Activities like nature walks, waste segregation, and water testing should be included to make concepts tangible. Professional development workshops should be conducted to train teachers in ABL methodologies, including lesson planning and classroom management. Additionally, educators should focus on creating gender-neutral pedagogy with inclusive lesson plans, ensuring equal participation for boys and girls. Enhanced classroom resources, including learning aids and activity kits, should be provided to facilitate interactive activities.
- **For policymakers and administrators**, curriculum reforms are necessary to emphasize experiential learning, particularly in regions with declining EVS performance. Guidelines for implementing ABL should be introduced across schools, focusing on rural and resource-constrained areas. Monitoring and evaluating ABL implementation through pre-and post-tests and developing metrics to optimize methodologies is essential. Investments in infrastructure, such as outdoor learning spaces, environmental labs, and activity corners, should be prioritized. Engaging the local community by organizing workshops, field trips, and conservation projects can connect students with their environment, and parental involvement can further promote environmental stewardship.
- **Future research directions** include exploring the scalability of ABL in other subjects to promote interdisciplinary learning and conducting longitudinal studies to assess its long-term impact on knowledge retention, critical thinking, and pro-environmental behaviours. These

recommendations aim to position ABL as a transformative approach in primary education, fostering environmental awareness and empowering students to address real-world challenges.

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