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ASSESSING THE IMPACT OF EXPERIENTIAL LEARNING IN PROMOTING ENVIRONMENTAL EDUCATION AND SUSTAINABLE PRACTICES

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Abstract

This study investigates the effectiveness of experiential teaching and learning methods in enhancing environmental education among 2nd-grade students in Hyderabad, India. Utilizing a mixed-methods approach, this quasi-experimental study involved 30 students from two schools managed by different organizations. The intervention group engaged in experiential learning activities designed to improve their understanding of environmental issues and promote sustainable practices. Pre-test and post-test assessments, along with qualitative data from interviews, focus group discussions, and observations, were used. Quantitative analysis revealed significant improvements in post-test scores among students exposed to experiential learning compared to those following traditional methods. The mean pre-test score of 9.97 increased to 16.80 in the post-test, indicating a notable enhancement in environmental knowledge. Qualitative data supported these findings, showing increased student engagement and critical thinking regarding environmental issues. The study demonstrates that experiential learning effectively fosters environmental awareness and sustainable practices among young students. The positive correlation between experiential learning interventions and improved educational outcomes highlights the potential for incorporating these methods into broader educational curricula to address environmental challenges comprehensively.

Keywords: *Environmental Education, Experiential Learning, Sustainable Development, Empowerment of Students, Environmental Awareness.*

1. INTRODUCTION

The importance of environmental education has drawn a lot of attention recently as societies deal with more urgent ecological issues. Environmental awareness is a crucial component of environmental literacy, encompassing motivation, knowledge, and skills. It comprises five aspects: knowledge, awareness, behavior, involvement, and attitude. The OECD defines environmental awareness as awareness of environmental issues, perception of environmental issues, and environmental

optimism. It is crucial to assess and enhance these competencies in the 21st century, as environmental awareness has grown significantly since the second half of the 20th century **(Amran et al., 2019)**. By teaching students about the fragility and indispensable nature of the physical environment, we can begin to address the problems that threaten it and work towards a more sustainable future. Environmental education is a dynamic process that is tied to experiential teaching approaches and is not limited to a specific classroom. It fosters students' critical thinking, personal growth, and experiential learning **(Koutsoukos, Fragoulis, & Valkanos, 2015, p. 27)**. Experience-based learning approaches, which emphasise student participation and practical application, are becoming increasingly recognised for their ability to improve students' comprehension of difficult environmental concepts. Experiential learning in environmental education can bridge the gap between reductionist approaches and holistic understanding, better preparing students to address future environmental challenges **(Wright, 2006)**. In India, experiential learning is becoming more and more popular with reference to NEP 2020. Through complete engagement in an experience and critical reflection, students who engage in experiential learning acquire knowledge, pick up new skills, and attitudes **(Sahni, 2023)**. This study emphasises the need for creative educational techniques in encouraging environmental awareness and sustainable habits among young learners by emphasising on a specific demographic: Hyderabad, India, 2nd-grade students. This study uses a mixed-methods approach to evaluate how well experiential learning promotes environmental education and to provide empirical data in favour of integrating it into conventional curriculum.

2. RESEARCH GAP

Environmental education is essential to develop ecologically conscientious citizens. On the other hand, little research has been done on the subject of experiential learning's efficacy in elementary education, particularly in developing nations like India. The majority of research focuses on secondary or higher education, which leaves a vacuum in our knowledge of how experiential learning affects the environmental knowledge and sustainable habits of foundational students. This study provides insights into educational outcomes and the heterogeneity of these outcomes across different school contexts by examining the effects of experiential learning on 2nd-grade students in Hyderabad, India.

3. RATIONALE OF THE STUDY

The growing environmental issues emphasise the necessity of developing efficient educational plans that encourage sustainable lifestyle choices at an early age. Hands-on activities combined with experiential learning have demonstrated potential in improving students' comprehension of complex concepts. In India, there isn't enough research done on its use in basic education, especially when it comes to environmental education. This study attempts to close a gap in the literature by presenting actual data on the effectiveness of experiential learning in fostering environmental education among young learners, with a focus on students in 2nd grade. The results may influence educational policies and aid in the creation of curriculum that incorporate experiential learning techniques.

4. RESEARCH QUESTIONS

- What is the impact of experiential learning on 2nd-grade students understanding of environmental issues and sustainable practices?
- How do the educational outcomes of students from government school compare to those from aided school after exposure to experiential learning outcomes?
- To what extent do experiential learning activities influence student's engagement, critical thinking, and problem solving activities related to environmental education?
- What is the variability in base-line environmental knowledge among students and how does it affect the outcomes of experiential learning interventions?

5. RESEARCH OBJECTIVES

- To assess how experiential teaching and learning methods improve environmental education and sustainable practices among 2nd-grade students.
- To compare the impact of experiential learning on environmental education between students from government and aided schools.

- To analyse the extent to which experiential learning activities enhance student engagement, critical thinking, and problem-solving abilities regarding environmental issues.
- To identify and assess the variability in baseline environmental education and the differential impact of experiential learning interventions.

6. REVIEW OF THE RELATED LITERATURE

(The Impact of Experiential Learning on Environmental Education During a Moroccan Summer University, n.d.). This study explains how enabling students direct access to their learning settings through experiential learning improves environmental education. Students get a deeper understanding of ecological principles and sustainability practices through hands-on, field-based experiences. The results show a significant increase in participants' environmental literacy, confirming the theory that deeper learning is fostered by active engagement.

The study looks into a range of experiential learning activities with an environmental focus intended to help students develop their critical thinking and knowledge of sustainability. The findings highlight the value of experiential learning in environmental education, as students who took part in these activities had significantly greater environmental knowledge than those who received conventional instruction. **(Lewis, n.d.)**.

The transforming impact of experiential learning in fostering sustainable behaviours is highlighted in this research study. Through participative experiences, students develop a dedication to sustainability and a personal connection to the environment. The study contains a survey analysis showing that after participating in experiential activities, students' perceptions of the significance of sustainable practices significantly increased. **(Friman et al., 2024)**.

According to **(Moseley, Summerford, Paschke, Parks, & Utley, 2020)** the study provide a thorough analysis of outdoor education initiatives that make use of experiential learning frameworks. It is concluded that these programs are successful in altering students' perspectives and mindsets on sustainability and environmental preservation. This study highlights how important outdoor education is in encouraging young learners to be environmental stewards.

The study looks into the effects of environmental education on Taipei fifth graders. Twenty-four children took part in five weeks of activities and a field trip to Elephant Mountain as part of a quasi-experimental design. The environmental education accomplishment test, attitude towards environmental education scale, and attitude towards environmental action skills all had higher post-test scores, according to the results. According to the study's findings, field trips and environmental education activities help fifth graders learn about the environment **(Lai, 2018)**.

The study suggests that a comprehensive method for teaching about ecological balance and biodiversity is experiential learning. Learners who actively interact with natural environments are more likely to understand intricate ecological concepts and the value of sustainable behaviours. The results validate the hypothesis that students' comprehension of environmental issues improves as a result of experience learning. **(Jose, Patrick, & Moseley, 2017)**.

7. RESEARCH METHODOLOGY

Research Design: This study employed a one-group pre-test and post-test quasi-experimental design on two different schools to examine the effectiveness of experiential teaching and learning methods in improving environmental education among 2nd-grade students in Hyderabad. The study used a mixed method approach combining quantitative and qualitative data analysis techniques. Sample of the Study: The sample of the study consists of 30 students from two different schools managed by two different organisations. The two organisations taken up for the study were government and the aided organisation. Each school comprised 15 students contributing to the experimental group. Data Collection Method: Pre-test and post-test assessments were used for collecting information about students' environmental knowledge. To acquire a deeper understanding of the experiences and perspectives of teachers and students regarding the experiential learning activities, qualitative data were also collected through focus groups and interviews.

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Table-1: Descriptive Statistics for Pre-test, Post-test, and Difference Score

	N	Range	Minimum	Maximum	Mean		Std. Deviation
	Statistic	statistic	statistic	statistic	statistic	Std.Error	Statistic
Pre-test score	30	15.00	1.00	16.00	9.9667	.85968	4.70864
Post-test Score	30	21.00	5.00	26.00	16.80000	1.25616	6.88026
Difference Score	30	11.00	2.00	13.00	6.8333	.48915	2.67921
Valid N	30						

Note. Table 1 presents the pre-test scores, post-test scores, and difference scores of 2nd-grade students. The pre-test scores ranged from 1 to 16, with a mean score of 9.97. Post-test scores ranged from 5 to 26, with a mean of 16.80, indicating a significant improvement in environmental knowledge. The difference scores, measuring the change in knowledge from pre-test to post-test, ranged from 2 to 13, with a mean of 6.83, indicating the intervention was effective in enhancing students' environmental knowledge. The wide range and standard deviation indicate variability in students' baseline environmental knowledge.

Table-2: Variance, Skewness, and Kurtosis for Pre-test, Post-test, and Difference Score

	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Pre-test Score	22.171	-.532	.427	-1.174	.833
Post-testScore	47.338	-.423	.427	-1.450	.833
DifferenceScore	7.178	-.132	.427	-.307	.833

Note. table 2 shows the variance, skewness, and kurtosis statistics for 30 students' pre-test, post-test, and difference scores. The variance of 22.171 indicates moderate variability in baseline environmental knowledge, while 47.338 indicates greater variability after the intervention. The difference scores have less dispersion, suggesting a consistent impact. The skewness of -0.532 indicates a slight left skew, while -0.423 indicates more students scored higher on the pre-test. The kurtosis of -1.174 and -1.450 indicate a platykurtic distribution, with a near-normal distribution for difference scores.

Pre-Test Core

Table-3*: Descriptive statistics for Mean, Standard deviation, and Standard Error Mean by School Type*

School Identifier	N	Mean	Std. Deviation	Std. Error Mean
Government School	15	6.2667	3.76955	.97329
Aided School	15	13.6667	1.54303	.39841

Note. Table 3 shows pre-test scores of 2nd-grade students from Government School and Aided School. The average pre-test score was 6.27, indicating lower baseline environmental knowledge. Aided School students had an average score of 13.67, indicating higher baseline environmental knowledge. The higher mean pre-test score suggests better initial understandingof environmental issues. The greater variability in government school scores indicates a more diverse range of knowledge levels, while aided school scores are consistently high. These differences emphasize the importance of considering school type when evaluating educational interventions.

Table-4: Independent Sample Test for Pre-Test Score

	Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	11.480	.002	-7.036	28	.000	-7.40000	1.05168	-9.55427	-5.24573
Equal variances not assumed			-7.036	18.564	.000	-7.40000	1.05168	-9.60470	-5.19530

Note. Table 4 presents the results of an independent sample t-test comparing pre-test scores between government and aided schools. The results show a significant difference in scores ($p<.002$), with aided school students scoring higher on average. The t-test for unequal variances is more appropriate, as the assumption of equal variances is violated. The 95% confidence interval for the mean difference ranges from -9.55 to -5.25 (equal variances assumed) and from -9.60 to -5.20 (equal variances not assumed), indicating that the true mean difference lies within these ranges.

Post-test Score:

Table-5: Descriptive statistics for Mean, Standard deviation, and Standard Error Mean by School Type

School Identifier	N	Mean	Std. Deviation	Std. Error Mean
Government School	15	11.1333	5.02660	1.29786
Aided School	15	22.4667	1.99523	.51517

Note. Table 5 shows post-test scores of 2nd-grade students from Government School and Aided School. The average post-test score was 11.13, indicating a higher level of environmental knowledge after the experiential learning intervention. The aided school students had a higher mean score of 22.47, indicating a better understanding of environmental issues and sustainable practices. The higher variability in government school scores suggests a more diverse range of knowledge levels, while the aided school scores were consistently high, highlighting the effectiveness of the experiential learning intervention.

Table-6: Independent Sample Test for Post-Test Score

Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper

Note. table 6 shows the results of an independent sample t-test comparing post-test scores of students from government and aided schools. The results show a significant difference in scores ($p < .004$) between the two groups, with aided school students scoring higher on average. This difference is observed in both equal variances assumed and not assumed scenarios, with the latter being more reliable due to the significant Levene's test. The 95% confidence interval for the mean difference ranges from -14.19 to -8.47 (equal variances assumed) and from -14.26 to -8.40 (equal variances not assumed). This substantial mean difference highlights the intervention's effectiveness in enhancing environmental knowledge.

Difference Score

Table-7: Descriptive Score for Difference Score by School Type

School Identifier	N	Mean	Std. Deviation	Std. Error Mean
Government School	15	4.8667	1.95911	.50584
Aided School	15	8.8000	1.65616	.42762

Note. Table 7 shows the statistical analysis of the improvement in environmental knowledge among students from government and aided schools. The average improvement in scores was 4.87 in government schools, with a standard deviation of 1.96 and a standard error mean of 0.51. In aided schools, the average improvement was 8.80, with a standard deviation of 1.66 and a standard error mean of 0.43. The aided school students showed a higher mean improvement score, indicating a more significant impact of the experiential learning intervention.

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Table-8: Independent Sample Test for Difference Score

	Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	1.016	.322	-5.938	28	.000	-3.93333	.66237	-5.29013	-2.57654
Equal variances not assumed			-5.938	27.245	.000	-3.93333	.66237	-5.29183	-2.57484

Note. Table 8 presents the independent sample t-test results which show a significant difference in improvement scores between government and aided schools. The mean difference is -3.93333, with aided school students showing greater improvement in environmental knowledge after the intervention compared to government school students. This difference is observed in both equal variances assumed and not assumed scenarios. The 95% confidence interval for the mean difference ranges from -5.29013 to -2.57654 (equal variances assumed) and from -5.29183 to -2.57484 (equal variances not assumed).

8. DISCUSSION

The findings of this study indicate that experiential learning methods significantly improve environmental knowledge among 2nd-grade students. The post-test scores show a marked increase compared to pre-test scores, with aided school students demonstrating higher gains.

Pre-Test Results:

The pre-test scores showed a significant difference between the government and aided school students. The aided school students had a higher average pre-test score (13.67) compared to the government school students (6.27), indicating a stronger baseline understanding of environmental knowledge among the aided school students. The variability in scores was also higher in the government school, suggesting a more diverse range of baseline knowledge levels.

Post-Test Results:

The post-test scores showed substantial improvements for both groups. The government school students' mean post-test score increased to 11.13, while the aided school students' mean post-test score increased to 22.47. The significant difference between the post-test scores of the two groups ($p < .004$) highlights the effectiveness of the experiential learning intervention, particularly for the aided school students.

Difference Score Results:

The difference scores, measuring the improvement from pre-test to post-test, also showed a significant difference between the two groups. The government school students had an average difference score of 4.87, while the aided school students had an average difference score of 8.80. The significant difference in improvement scores ($p < .000$) indicates that the experiential learning intervention had a more pronounced impact on the aided school students.

Analysis of Variance, Skewness, and Kurtosis:

The variance in pre-test and post-test scores indicated moderate to high variability, reflecting the diverse knowledge levels among students. The difference scores had less dispersion, suggesting a more consistent impact of the intervention. The skewness and kurtosis

values indicated a slight left skew and a platykurtic distribution, with a near-normal distribution for difference scores.

The higher variability in government school scores suggests that experiential learning interventions may need to be tailored to accommodate diverse learning needs and baseline knowledge levels. In contrast, the consistently high scores in the aided school indicate a more uniform benefit from the intervention, possibly due to better initial preparation and resources.

9. CONCLUSION

This study shows the effectiveness of experiential learning methods in enhancing environmental education among 2nd-grade students in Hyderabad. The significant improvements observed in post-test scores across both school types underscore the potential of hands-on, interactive learning activities to foster a deeper understanding of environmental issues. The results indicate that while experiential learning benefits all students, the degree of improvement can vary based on baseline knowledge and resources available to different schools. Future research should explore long-term impacts and the scalability of such interventions across different educational contexts. Tailoring interventions to address diverse learning needs and resource disparities can further enhance the effectiveness of experiential learning in environmental education.

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