Effectiveness of Techno-Scaffolding in Teaching of English for IX Standard Students in Relation to Their Techno-Adaptability

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Abstract**—***The integration of digital technology into school education necessitates pedagogically sound instructional strategies that support learners effectively. The present study examined the effectiveness of techno-scaffolding in teaching English to IX standard students and explored its relationship with students' techno-adaptability. A quasi-experimental single-group pre-test–post-test design was adopted. The sample comprised 60 IX standard slow learners selected through criterion-based purposive sampling from Government and Government-Aided schools in Chidambaram Taluk, Cuddalore District, Tamil Nadu. The tools used were an Achievement Test in English and a Techno-Adaptability Scale. Statistical analyses included t-test, gain ratio, effect size, and Pearson's correlation. The findings revealed a significant improvement in achievement in English after the techno-scaffolding intervention, with a high gain ratio and extremely large effect size. Significant positive relationships were found between achievement in English and techno-adaptability and its dimensions. The study concludes that techno-scaffolding is an effective instructional strategy for enhancing English achievement, particularly when learners possess adequate techno-adaptability.*

Index Terms**—**Techno-scaffolding, Achievement in English, Techno-adaptability, Secondary school students, Digital learning.

I. INTRODUCTION

The rapid advancement of digital technologies has transformed traditional teaching–learning processes, especially in language education. English, being a global language and a core subject at the secondary level, requires innovative instructional approaches that address learners' diverse needs. Conventional teacher-centred methods often fail to provide individualized support, resulting in low achievement among secondary school learners. In this context, techno-scaffolding, which integrates digital tools with structured instructional support, offers a promising approach to enhance learning outcomes.

II. NEED AND SIGNIFICANCE OF THE STUDY

With increasing emphasis on digital pedagogy and blended learning, there is a need to understand how technology can function as an instructional scaffold rather than merely a delivery tool. IX standard represents a crucial stage in language development, where appropriate scaffolding can significantly influence academic achievement. The present study is significant as it provides empirical evidence on the effectiveness of techno-scaffolding and highlights the role of techno-adaptability in determining learning outcomes. The findings are useful for teachers, teacher educators, curriculum planners, and policymakers in designing effective technology-integrated instructional practices.

III. OBJECTIVES OF THE STUDY

- To study the effectiveness of techno-scaffolding on achievement in English among IX standard students.
- To find out the relationship between achievement in English and techno-adaptability and its dimensions.

IV. HYPOTHESES

- There is no significant difference between the pre-test and post-test achievement in English scores of the experimental group.
- There is no significant difference between the post-test and retention test achievement in English scores of the experimental group.
- There is no significant relationship between achievement in English and techno-adaptability and its dimensions.

V. METHODOLOGY

Research Method:

The study employed a quasi-experimental method, as it enabled the investigator to examine the causal effect of the techno-scaffolding intervention on students' achievement in English.

Design:

A single-group pre-test–post-test design was adopted: Pre-test → Techno-Scaffolding Treatment → Post-test → Retention Test.

Sample:

The sample consisted of 60 IX standard students selected from Government and Government-Aided schools in Chidambaram Taluk, Cuddalore District, Tamil Nadu. The sample included students of mixed gender composition.

Sampling Technique:

A criterion-based purposive sampling technique was adopted. All students identified as slow learners in English were deliberately selected, as they satisfied the criteria essential for the experimental treatment.

Tools Used:

- Techno-scaffolding Instructional Package – developed by the investigators (Vinothini S & Dr. Veena S., 2025).
- Achievement Test in English (Pre-test and Post-test) – constructed and standardized by the investigators (Vinothini S & Dr. Veena S., 2025).
- Techno-Adaptability Scale – constructed and standardized by the investigators (Vinothini S & Dr. Veena S., 2025).

Procedure:

The pre-test was administered to measure baseline achievement in English. The techno-scaffolding instructional package was implemented for four weeks with 45-minute sessions. After the treatment, the post-test and retention test were administered. Data were analysed using appropriate statistical techniques.

VI. ANALYSIS AND INTERPRETATION

Hypothesis 1:

There is no significant difference between the pre-test and post-test scores for the Experimental Group who were taught by the Techno-Scaffolding instructional package.

Table 1: Comparison of Achievement in English of the Experimental Group at the Pre-test and Post-test Stage

Experimental Group	N	Mean	SD	't' value	Level of Significance at 0.05 level
Pre-test	60	9.02	1.490	47.405	<.001 Significant
Post-test	60	20.22	2.187		

To determine whether there is a significant difference between the pre-test and post-test scores of IX standard students in the experimental group, the investigator calculated the t-value. As shown in Table 1, the calculated t-value was 47.405, which is significant at the 0.05 level. Therefore, Hypothesis 1 is rejected, indicating that the techno-scaffolding instructional package produced a significant improvement in the achievement in English of the experimental group. The mean pre-test score of students was 9.02 (SD = 1.490), whereas the mean post-test score was 20.22 (SD = 2.187). The increase in mean score indicates an improvement in English achievement after the implementation of techno-scaffolding. The t-test analysis revealed a statistically significant difference between pre-test and post-test achievement in English scores, indicating the effectiveness of the techno-scaffolding instructional package.

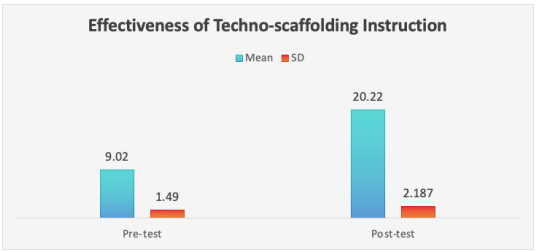

Fig. 1: Bar diagram showing the Effectiveness of Techno-scaffolding

Hypothesis 2:

There is no significant difference in Achievement in English between the post-test and retention test scores of the experimental group.

Table 2: Comparison of Achievement in English of the Experimental Group at the Post-test and Retention Test Stage

Test	Mean	Std. Deviation	t	df	Significance p
Retention Test	19.02	2.490	0.405	59	<.701
Post-test	20.22	2.187			

To examine the difference between the post-test and retention-test scores of the experimental group in Achievement in English, a t-test was conducted ($t(59) = 0.405$, $p > 0.05$). The calculated t-value of 0.405 was not significant at the 0.05 level. Therefore, the null hypothesis is accepted, indicating that there is no significant difference between the post-test and retention-test scores of the experimental group. This suggests that the learning acquired through the techno-scaffolding instructional package was effectively retained by the students over time.

Hypothesis 3:

There is no significant relationship between Achievement in English and Techno-Adaptability for the Experimental Group with respect to: Digital Confidence, Self-Regulated Technology Use, and Attitude towards Technology-Based Learning.

In order to examine the relationship between Achievement in English and the various dimensions of Techno-Adaptability for the experimental group, correlation analysis was carried out.

Table 3: Relationship between Achievement in English and Techno-Adaptability

Techno-adaptability and its dimensions	Statistic	Post-test of Achievement in English
D1. Digital Confidence	Pearson Correlation	.444
	Sig. (2-tailed)	.000
D2. Self-Regulated Technology Use	Pearson Correlation	.473
	Sig. (2-tailed)	.000
D3. Attitude Towards Technology-Based Learning	Pearson Correlation	.437
	Sig. (2-tailed)	.000
Techno-adaptability (Overall)	Pearson Correlation	.441
	Sig. (2-tailed)	.000

***. Correlation at 0.001 (2-tailed); *. Correlation is significant at the 0.05 level (2-tailed).*

Pearson's correlation analysis showed significant positive relationships between post-test achievement in English and techno-adaptability and its dimensions: Digital Confidence ($r = .444$, $p < .01$), Self-Regulated Technology Use ($r = .473$, $p < .01$), Attitude Towards Technology-Based Learning ($r = .437$, $p < .01$), and Overall Techno-Adaptability ($r = .441$, $p < .01$). The table values show that there exist positive and significant relationships between Techno-adaptability and Achievement in English of IX standard students. Hence the framed hypothesis is rejected.

- There exists a positive and significant relationship between Digital Confidence and post-test achievement in English.
- There exists a positive and significant relationship between Self-Regulated Technology Use and post-test achievement in English.
- There exists a positive and significant relationship between Attitude Towards Technology-Based Learning and post-test achievement in English.
- There exists a positive and significant relationship between techno-adaptability and post-test achievement in English.

VII. DISCUSSION OF FINDINGS

The findings indicate that techno-scaffolding significantly improved achievement in English among IX standard students. The significant positive relationship between achievement and techno-adaptability suggests that students who are digitally confident, self-regulated, and possess positive attitudes towards technology benefit more from technology-mediated instruction. The absence of a significant difference between post-test and retention test scores confirms effective retention of learning.

VIII. EDUCATIONAL IMPLICATIONS

The study highlights the need for integrating techno-scaffolding strategies in English classrooms to support slow learners. Teachers should focus on developing students' techno-adaptability alongside content instruction. Teacher education programmes should emphasize digital pedagogy and scaffolded instruction to enhance learning outcomes.

IX. CONCLUSION

The present study concludes that techno-scaffolding is an effective instructional strategy for improving achievement in English among IX standard students. The strong relationship between techno-adaptability and achievement underscores the importance of learners' technological readiness in technology-mediated learning environments. The findings provide valuable insights for effective integration of technology in secondary school English education.

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