Effectiveness Of Techno-Pedagogy In Social Science Teaching Among Secondary Schools Students

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Abstract

The increasing integration of technology in school education has necessitated a rethinking of conventional teaching practices. This study investigates the effectiveness of techno-pedagogical strategies in teaching Social Science at the secondary school level. Techno-pedagogy combines appropriate technological tools with pedagogical principles to enhance students' understanding, engagement, and academic achievement. Using a quasi-experimental design, the study involved 80 secondary school students and 10 Social Science teachers. Data were collected through achievement tests. The results revealed a significant improvement in students' academic performance, classroom participation, and learning motivation when techno-pedagogical methods were employed. However, challenges such as inadequate infrastructure, limited professional training, and time constraints in lesson preparation were also identified. The study concludes that techno-pedagogy can serve as an effective instructional approach in Social Science education and offers practical implications, limitations, and directions for future research.

Keywords: Techno-Pedagogy, Social Science Teaching, Secondary Schools

Introduction

Technological advancement has brought about substantial changes in the educational landscape, influencing how knowledge is taught and learned in schools. Traditional teacher-centered classrooms are gradually being replaced by interactive and learner-centered environments supported by digital tools. Students in the present era are increasingly exposed to technology in their daily lives, making it essential for teachers to integrate technology meaningfully into classroom instruction.

Techno-pedagogy refers to the purposeful integration of technology with pedagogical practices to facilitate effective teaching and meaningful learning. In the context of Social Science education, which includes subjects such as history, geography, political science, and economics, learners often encounter abstract concepts and complex ideas. The use of digital resources such as animations, interactive maps, virtual field visits, documentaries, and online quizzes helps simplify these concepts and makes learning more engaging and relevant.By promoting active participation, critical thinking, and conceptual understanding, techno-pedagogical approaches can enhance both teaching effectiveness and student learning outcomes. Therefore, examining the effectiveness of techno-pedagogy in Social Science teaching at the secondary level is essential to understand its role in improving academic achievement and learner engagement in contemporary classrooms.

Review of Related Literature

Previous studies consistently highlight the growing importance of techno-pedagogical competencies in teaching and learning. Research across school and teacher-education contexts (Beri & Sharma, 2019; Guru & Beura, 2019; Bhargava, 2023) reports generally high or moderate levels of techno-pedagogical skills among teachers, with variations across gender, school type, locale, and discipline in some cases. Several studies establish a positive relationship between teachers' techno-pedagogical competency and students' academic achievement, online teaching effectiveness, teacher efficacy, and employability of prospective teachers (Guru & Beura, 2019; Setua, 2022; Narayanan & Komalavalli, 2022).

Literature reviews and conceptual studies (Asad et al., 2021; Hota, 2023; Miah & Parhi, 2024; Sijali & Poudel, 2025) emphasize that techno-pedagogical integration enhances engagement, digital literacy, 21st-century skills, and instructional efficiency, especially in post-COVID digital classrooms. However, recent empirical evidence (Nagarajan & Selvakumar, 2025) suggests that techno-pedagogical skills alone may not directly translate into higher teaching competency, indicating the need for contextualized training and deeper pedagogical integration.

Objectives of the Study

- To evaluate the effectiveness of the techno-pedagogic approach in improving Social Science achievement among secondary school students.
- To compare the post-test achievement scores of students taught through the techno-pedagogic approach and those taught through the traditional teaching method.
- To examine the difference between pre-test and post-test achievement scores of students in the Experimental Group and in the Control Group.

Hypotheses of the Study

H_1 1 There is a significant disparity between the mean values of pretest in the social achievement among the Control and Experimental Group.

H_1 2 There is a significant disparity between the mean values of post test scores in the social achievement among the Control and Experimental Group.

H_1 3 There is a significant disparity between the mean values of pretest and post test scores in social achievement among the Experimental Group.

H_1 4 There is a significant disparity between the mean values of pretest and post test scores in social achievement among the Control Group.

Methodology

The study adopted a quasi-experimental research design to examine the effectiveness of the techno-pedagogical approach in Social Science teaching at the secondary school level. The sample comprised 80 secondary school students and 10 Social Science teachers, selected using stratified random sampling technique from Vijayapur district.

A self-developed achievement test was used as the primary tool for data collection. Initially, a pre-test was administered to both the control and experimental groups to assess their baseline level of achievement in Social Science. Following the pre-test, the experimental group was exposed to techno-pedagogy-based instruction, incorporating digital teaching–learning resources such as PowerPoint presentations, animations, educational videos, digital maps, and interactive quizzes. In contrast, the control group was taught using conventional teaching methods.

After the completion of the instructional intervention, a post-test was administered to both groups to measure the impact of the respective teaching approaches. The pre-test and post-test scores were then analyzed to determine the effectiveness of the techno-pedagogical approach in enhancing students' academic achievement.

Result

H$_1$ 1: There is a significant disparity between the mean values of pretest in the social achievement among the Control and Experimental Group.

Table 1: represents the mean scores of pre-test in social achievement among the CG & EG

Variation	N	Mean	SD	df	t-value	p-value	Hypothesis supported
Control Group	40	10.30	3.337	39	3.941	0.000*	YES
Experimental group	40	7.55	3.381				

Note: *Significant at 0.05 level

The paired-sample t-test results, as illustrated in table 1, reveal that the pre-test scores of the control group (N=40) with a mean of 10.30 and the experimental group with a mean of 7.55 exhibit notable disparities. The standard deviations for the control group (3.337) and experimental group (3.381) differ significantly, observed with 39 degrees of freedom. The computed t-value of 3.941 corresponds to a p-value of 0.000, exceeding the predetermined significance level.

Inference: Consequently, the initial alternative hypothesis is retained, leading to the conclusion that there is a statistically significant distinction in the pre-test mean scores of social achievement between the Control and Experimental Groups.

H$_1$ 2 : There is a significant disparity between the mean values of post test scores in the social achievement among the Control and Experimental Group.

Table 2: represents the mean scores of post test in social achievement among the CG & EG

Variation	N	Mean	SD	df	t-value	p-value	Hypothesis supported
Control Group	40	17.28	4.455	39	26.752	0.000*	YES
Experimental group	40	43.23	3.799				

Note: *Significant at 0.05 level

The outcomes of the paired-sample t-test, as depicted in table 2, indicate substantial discrepancies between the initial scores of the control group (N=40) with a mean of 17.28 and the experimental group with a mean of 43.23. The noticeable difference in standard deviations for the control group (4.455) and experimental group (3.799) is statistically significant, noted at 39 degrees of freedom. The calculated t-value of 26.752 corresponds to a p-value of 0.000, surpassing the predetermined level of significance.

Inferences: Consequently, the original hypothesis is accepted, leading to the determination that there is a statistically significant differentiation in the posttest average scores of social achievement between the Control and Experimental Groups.

H₁ 3: There is a significant disparity between the mean values of pretest and post test scores in social achievement among the Experimental Group.

Table 3: represents the mean scores of post test in social achievement among the EG

Variation	N	Mean	SD	df	t-value	p-value	Hypothesis supported
Pretest	40	7.55	3.381	39	47.317	0.000*	YES
Posttest	40	43.23	3.799				

Note: *Significant at 0.05 level

The paired-sample t-test results, as illustrated in table 3, reveal that the pre-test scores of the control group (N=40) with a mean of 10.30 and the mean posttest scores are 7.55 exhibit notable disparities. The standard deviations for the control group (3.337) and posttest are (3.381) differ significantly, observed with 39 degrees of freedom. The computed t-value of 3.941 corresponds to a p-value of 0.000, exceeding the predetermined significance level.

Inference: Consequently, the initial alternative hypothesis is retained, leading to the conclusion that there is a statistically significant distinction in the pre-test & posttest mean scores of social achievement among the Experimental Groups.

H₁ 4: There is a significant disparity between the mean values of pretest and post test scores in social achievement among the Control Group.

Table 4: represents the mean scores of pre test and post test in social achievement among the CG

Variation	N	Mean	SD	df	t-value	p-value	Hypothesis supported
Pretest	40	10.30	3.337	39	9.010	0.000*	YES
Posttest	40	17.28	4.455				

Note: *Significant at 0.05 level

The outcomes of the paired-sample t-test, as depicted in table 4, indicate substantial discrepancies between the initial scores of the control group (N=40) with a mean of 10.30 and the posttest with a mean of 17.28. The noticeable difference in standard deviations for the control group pretest is (3.337) and (4.455) is statistically significant, noted at 39 degrees of freedom. The calculated t-value of 9.010 corresponds to a p-value of 0.000, surpassing the predetermined level of significance.

Inferences: Consequently, the original hypothesis is accepted, leading to the determination that there is a statistically significant differentiation in the posttest average scores of social achievement between the Control and Experimental Groups.

Findings:

- There is a significant difference found between the mean values of pretest in the social achievement among the Control and Experimental Group.
- There is a significant difference between the mean values of post test scores in the social achievement among the Control and Experimental Group.
- There is a significant difference between the mean values of pretest and post test scores in social achievement among the Experimental Group.
- There is a significant difference between the mean values of pretest and post test scores in social achievement among the Control Group.

Educational Implications

- The findings emphasize the need for Social Science teachers to adopt techno-pedagogical strategies such as digital maps, animations, videos, and interactive quizzes to make abstract concepts concrete and meaningful.
- Teacher training institutions should integrate techno-pedagogical skills as a core component of pre-service and in-service teacher education programs to enhance instructional effectiveness.
- Curriculum frameworks should encourage the systematic integration of technology-enabled learning activities aligned with pedagogical objectives, especially in subjects like Social Science.
- Schools must be provided with adequate technological infrastructure, digital resources, and continuous professional development opportunities to facilitate effective techno-pedagogical implementation.
- The use of techno-pedagogical approaches promotes active participation, learner autonomy, motivation, and higher-order thinking skills, thereby supporting holistic learning outcomes.

Conclusion

The present study conclusively demonstrates that the techno-pedagogical approach is significantly more effective than traditional teaching methods in enhancing Social Science achievement among secondary school students. By integrating technology with sound pedagogical practices, teachers can create interactive, learner-centered classrooms that foster deeper understanding and sustained engagement. Although traditional methods contribute to learning improvement, their impact is comparatively limited. Despite challenges such as inadequate infrastructure and limited teacher training, the benefits of techno-pedagogy outweigh its constraints. Therefore, the study strongly recommends the systematic adoption of techno-pedagogical practices in secondary school education to meet the demands of 21st-century learners and to improve overall teaching–learning effectiveness.

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