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Research Article

A Study On The Effectiveness Of Smart Classes For Primary School Students In The Context Of Achievement

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ABSTRACT

In the dynamic landscape of education, the search for innovative methodological tools to address diverse student needs continues. This research investigates the effectiveness of smart classes in science education for primary school students, focusing specifically on geographical regions. As technology becomes integral to education, the study aims to examine the impact of smart classrooms on learning outcomes. The purpose of this research is to inform educators, administrators, and policy makers by providing practical insights to optimize science teaching. This study employs a post-test only design with two groups to compare the effects of smart classes (experimental group) and traditional methods (control group) on students' academic achievement. The findings of the present study indicate a significant positive impact of smart classes on individual students. While urban students experience clear benefits, positive outcomes also extend to rural students. In conclusion, this research demonstrates the effectiveness of smart classes on academic achievement in primary school science education, which applies to students from both rural and urban areas.

Keywords: Smart Class, Science Teaching, Digital Technology, Grade-8, Area

Introduction

In today's rapidly evolving educational landscape, there is a growing emphasis on integrating innovative pedagogical tools to cater to the diverse learning needs of students. Among these innovations, smart classrooms have emerged as a powerful educational solution, particularly in enhancing engagement and learning outcomes in science education. This study focuses on examining the effectiveness of smart classrooms for primary school students, with special reference to their academic achievement in science.

Smart classrooms utilize technology-integrated environments where interactive whiteboards, multimedia content, real time assessments, and internet-enabled resources create dynamic and personalized learning experiences (Palanisamy & Saravanakumar, 2021). The shift from traditional to smart learning environments has shown potential for improving conceptual understanding, active participation, and retention, especially among younger learners whose curiosity and adaptability to digital tools are notably high (Rahmatullah et al., 2023).

This research is contextualized within a specific geographical region to account for the localised educational challenges and opportunities. Regional differences, including access to infrastructure, teacher training, and socioeconomic conditions, often influence the implementation and outcomes of smart learning environments. Therefore, this study aims to investigate how the smart classroom approach influences academic performance in science subjects among primary school students in the selected area.

The significance of this study lies not only in measuring academic gains but also in its practical implications. The results are intended to support teachers, school administrators, and educational policymakers in making informed decisions about integrating smart technologies into science education at the primary level. Additionally, the findings may contribute to enhancing curriculum delivery, developing teacher competencies, and optimizing learning environments in alignment with 21st-century educational goals (Vishal, 2022).

By focusing on a younger student demographic and grounding the research in a specific context, this study aims to bridge the gap between technological innovation and real-world classroom application. It contributes to the growing body of literature that seeks to validate the pedagogical impact of digital learning tools in foundational education.

Literature Review

The integration of smart classroom technologies in primary education has gained significant attention globally, with substantial research examining their impact on student achievement. Smart classes, characterized by interactive whiteboards, digital content, multimedia presentations, and computer-assisted learning tools, represent a paradigm shift from traditional teaching methods.

International studies demonstrate positive correlations between smart classroom implementation and academic performance. Research by Kennewell and Beauchamp (2007) highlighted that interactive whiteboards enhance student engagement and conceptual understanding in mathematics and science. Similarly, Glover et al. (2007) found that multimedia-rich environments facilitate better retention and comprehension among primary students. A meta-analysis by Tamim et al. (2011) across multiple countries revealed that technology-enhanced learning environments consistently outperformed traditional classrooms in achievement measures.

In the Indian context, several studies have examined smart classroom effectiveness. Sharma and Bhaumik (2013) conducted research in Delhi schools, finding that students in smart classrooms showed 23% improvement in mathematics scores compared to traditional methods. Yadav and Patwardhan (2016) studied rural Maharashtra schools, demonstrating that smart classes particularly benefited students from disadvantaged backgrounds, reducing achievement gaps significantly.

Banerjee et al. (2016) implemented a randomized controlled trial across 100 Indian schools, revealing that computerassisted learning programs improved mathematics and Hindi language outcomes by 0.28 and 0.15 standard deviations respectively. The study emphasized the importance of teacher training and curriculum alignment for optimal results. However, challenges remain prominent in Indian implementations. Insufficient infrastructure, teacher resistance to technology adoption, and maintenance issues have been documented by Srivastava (2018). Research by Chakraborty and Mondal (2014) indicated that without proper pedagogical training, smart classroom tools may become mere presentation devices rather than interactive learning facilitators.

Contemporary studies suggest that smart classes are most effective when combined with constructivist teaching approaches, adequate teacher professional development, and sustained institutional support. The evidence indicates significant potential for improving primary education outcomes, particularly in developing countries like India, when implementation addresses both technological and pedagogical dimensions.

Statement of the Problem

The researcher seeks to examine the effectiveness of smart classrooms in the context of Achievement.
Therefore, the problem statement is as follows:

A Study of the Effectiveness of Smart Classrooms for Primary School Students in Context of achievement Objectives

The objectives of the present study were as follows:

1. To examine the effectiveness of smart classes for some selected units of science education.
2. To examine the effectiveness of smart classes for some selected units of science education in the context of area.

Hypotheses

The hypotheses of the present study are as follows:

Ho1 - There will be no significant difference between the mean scores obtained by students of the experimental group and control group on the post-test.

Ho2 - There will be no significant difference between the mean scores obtained by students of urban areas in the experimental group and control group on the post-test.

Ho3 - There will be no significant difference between the mean scores obtained by students of rural areas in the experimental group and control group on the post-test.

Ho4 - There will be no significant difference between the mean scores obtained by students of rural areas and urban areas in the experimental group on the post-test.

Limitations and Delimitations

The present study was limited to primary schools of Ahmedabad and the limitations of the researcher-made post-test is a limitation of the present study. The present study was geographically limited to primary schools in Ahmedabad district only. The research was constrained by the inherent limitations of the pre-test and posttest methodology employed by the researcher. The scope was further delimited by focusing exclusively on primary education level, excluding secondary and higher education institutions from the investigation.

Definition of Key Words

Smart Class: Smart class refers to an innovative learning environment equipped with advanced educational technological tools and interactive teaching aids to enhance integrated learning experiences. These classrooms are equipped with digital resources such as interactive whiteboards, multimedia content, educational software, and internet connectivity, etc. The primary objective of smart class is to create an engaging and dynamic environment that promotes interactive learning, collaboration, and effective knowledge transfer. The purpose of technology integration is to make the teaching and learning process more interactive, personalized, and aligned with modern educational requirements.

Academic Achievement: In the present study, the scores obtained by students in their post-test were considered as their academic achievement.

Variables

The variables of the present study are as follows:

Independent Variable: Teaching Method

- Smart Class (Experimental Group)
- Traditional Method (Control Group)

Dependent Variable: Academic Achievement (Scores obtained on post-test) **Moderator Independent Variable:** Area: Urban and Rural

Controlled Variables:

- Subject: Science
- Medium: Gujarati
- Area: Ahmedabad

Population and Sample

All students studying in Standard-8 Gujarati medium schools in Ahmedabad were included in the population of the present research. As a sample, one school from bavla in Ahmedabad district was purposively selected. Two classes out of three classes were selected through lottery method. All students of the selected classes were included in the study sample through cluster method. For easy conduct of the experiment, it was carried out on the entire class. However, for analysis, 86 (45 + 41) students who attended regularly were selected as the sample.

Research Method and Experimental Design:

The experimental method is a way to test the effectiveness of independent variables on dependent variables. For the present study, the experimental method of research was used. The experiment of the present research was to test the effectiveness of smart class for some selected units of science. The complete experimental design of this present research is 'Two Group Post-Test Only Design', which can be represented as follows:

Group	Treatment	Post-Test
Experimental	X1 (Smart Class)	T2
Control	X2 (Traditional)	T2

Treatment

The design of the smart class was carried out with careful attention, reflecting a comprehensive and extensive approach by the researcher. The development process began with an in-depth study of subject content, aiming to create smart class lessons that would be engaging and effective in delivering educational material. PowerPoint presentations were meticulously prepared to present complex scientific concepts in a visually appealing and understandable manner. Live quizzes were incorporated to introduce an interactive element. Educational games were included as an innovative strategy to make learning more enjoyable and encourage active participation. These games were thoughtfully designed to align with the objectives of the science curriculum while ensuring both entertainment and educational value. Video content was integrated into the smart class treatment, providing dynamic visuals and real-world examples to complement theoretical knowledge. The smart class treatment underwent a rigorous review process by experts in the field of science education.

Tools for Data Collection

In the data collection phase, the researcher developed a teacher-made post-test based on a blueprint. The posttest included 30 questions, with each question carrying one mark. The format of the post-test consisted of multiple-choice questions that provided respondents with a set of four options for each question. The use of a validated blueprint ensured that the post-test effectively covered the relevant aspects aligned with the objectives of the research.

Data Analysis

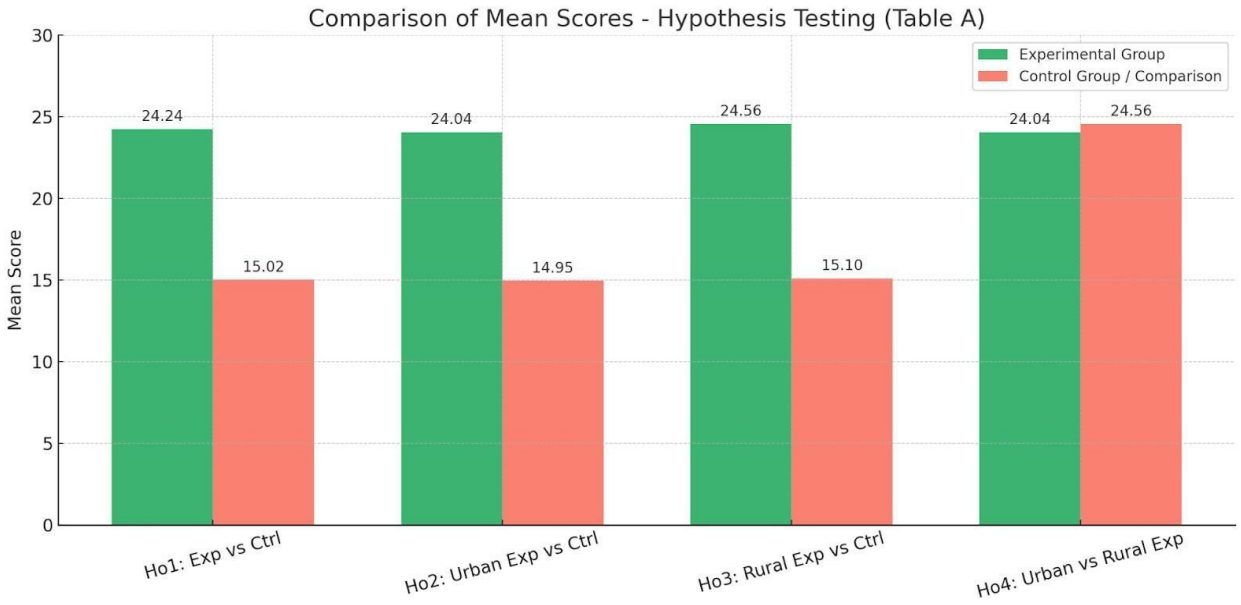
First, to test the equivalence of experimental and control groups, t-value was calculated between the scores of academic test. Then the effectiveness of smart class was evaluated through t-value calculation. T-values were calculated to determine the acceptance or rejection of hypotheses. The results of this analysis are presented in Table-A.

Table A:

Hypothesis Testing

Hypotheses	Group	N	M	SD	SEd	t-value	Remarks
Group Equivalence	Experimental Group	45	38.82	4.68	1.05	1.96	NS
	Control Group	41	36.76	5.06			
Ho1	Experimental Group	45	24.24	3.34	0.60	15.41	0.01
	Control Group	41	15.02	2.12			
Ho2	Experimental Group Urban Area Students	27	24.04	3.07	0.79	11.57	0.01
	Control Group Urban Area Students	20	14.95	2.31			
Ho3	Experimental Group Rural Area Students	18	24.56	3.69	0.96	9.81	0.01
	Control Group Rural Area Students	21	15.10	1.92			
Ho4	Experimental Group Urban Area Students	27	24.04	3.07	1.05	0.49	NS
	Experimental Group Rural Area Students	18	24.56	3.69			

Note: NS = Not Significant, 0.01 = Significant at 0.01 level The graph for Ho1, Ho2 and Ho3 is as follows:



Findings:

1. Effect on Overall Group:

The study found a significant effect of smart class on the overall group of students. The teaching material positively influenced the academic achievements of individual students in the experimental group compared to the control group.

2. Area-based Effects:

a. Urban: In addition to the overall positive effect on the entire group, a significant effect of smart class was observed among students in urban areas. This means that students from urban areas in the experimental group excelled in terms of academic achievement compared to students in the control group.

b. Rural: In the present study, a significant effect of smart class was observed on the academic achievements of students in rural areas. The performance of students from rural areas in the experimental group was significantly different from students from rural areas in the control group.

3. Area-based Comparative Analysis:

Smart class did not show a clear difference in its influence on the educational outcomes of students from urban and rural areas in the experimental group.

Educational Implications

The educational implications of the present study are as follows:

a. Adaptive Implementation Strategies: Teachers and administrators should recognize the importance of adapting smart class implementation strategies in the context of specific educational settings. This includes understanding the unique dynamics of urban and rural classrooms and using technology accordingly.

b. Equal Access: Policymakers should strive for equal access to smart class technology, especially in rural areas where positive effects were observed.

c. Continuous Evaluation: The lack of significant differences in comparative analysis suggests the need for continuous evaluation of smart class programs. Regular assessments should be conducted to understand the evolving impact of technology on educational outcomes in various areas and to make informed decisions for continuous improvement.

d. Professional Development: Teachers and trainers should receive adequate professional development opportunities to effectively use smart class techniques. This is crucial for promoting a technically proficient teaching environment to enhance the positive impact of these tools in both urban and rural classrooms.

Conclusion

In conclusion, this research examines the effectiveness of smart classes for primary school students, particularly focusing on science teaching within specified geographical areas. This study expresses the transformative potential of technology in education, emphasizing the importance of strategies tailored to meet the diverse needs of primary school students. This research successfully explored the effectiveness of smart class technology through a meticulous process that included smart class teaching, data collection through teacher-made post-tests, and comprehensive statistical analysis. The findings highlight the significant positive effects of smart class on the overall student group. The study observed area-specific variations in the impact of smart class. Urban students experienced clear effects while positive influence also extended to rural students. This research contributes valuable insights to the field of educational technology, demonstrating that when implemented thoughtfully, smart class interventions can serve as powerful tools for enhancing learning outcomes across diverse educational contexts

References

1. Agrawal, J. C. (1996). *Educational research: An introduction*. Arya Book Depot.
2. Banerjee, A., Cole, S., Duflo, E., & Linden, L. (2016). Remedying education: Evidence from two randomized experiments in India. *The Quarterly Journal of Economics, 131*(3), 1235–1264.
3. https://doi.org/10.1093/qje/qjw019
4. Chakraborty, A., & Mondal, D. (2014). Impact of smart classroom teaching on academic achievement of rural students. *International Journal of Educational Research and Technology, 5*(2), 12–18.
5. Desai, K. G., & Desai, H. G. (1997). *Research methods and techniques* (6th ed.). University Granth Nirman Board. Glover, D., Miller, D., Averis, D., & Door, V. (2007). The evolution of an effective pedagogy for teachers using the interactive whiteboard in mathematics and modern languages: A case study from the secondary sector. *Learning, Media and Technology, 32*(1), 5–20. https://doi.org/10.1080/17439880601141146
6. Kennewell, S., & Beauchamp, G. (2007). The features of interactive whiteboards and their influence on learning. *Learning, Media and Technology, 32*(3), 227–241. https://doi.org/10.1080/17439880701511073
7. Palanisamy, P., & Saravanakumar, S. (2021). Effectiveness of techno-pedagogical module to enhance smart class teaching competencies among DIET teacher trainees. *Unpublished manuscript*.
8. Rahmatullah, R., Usman, M., Takdir, M., & Hermansyah, S. (2023). The effect of using the Smart Apps Creator on science learning outcomes of Class VII students of MTSN 2 Sidrap. *International Journal of Educational Narratives, 1*(1), 52–

9. 59. https://doi.org/10.55849/ijen.v1i1.524
10. Sharma, R., & Bhaumik, P. K. (2013). Smart classroom: Striding towards smarter education. *International Journal of Education and Psychological Research, 2*(4), 22–25.
11. Srivastava, M. (2018). Challenges in implementation of smart classrooms in Indian schools: A comprehensive study. *Journal of Educational Technology Systems, 46*(3), 293–312.
12. https://doi.org/10.1177/0047239517738872
13. Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C., & Schmid, R. F. (2011). What forty years of research says about the impact of technology on learning: A second-order meta-analysis and validation study. *Review of Educational Research, 81*(1), 4–28. https://doi.org/10.3102/0034654310393361
14. Vishal, A. (2022). Perception of secondary school teachers toward smart class at Patna district. *Unpublished manuscript*. Yadav, S., & Patwardhan, A. (2016). Digital learning in rural primary schools: Impact assessment of smart classroom interventions in Maharashtra. *Indian Journal of Educational Technology, 8*(2), 45–58