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Impact of Digital Education on Academic Achievement: A Comparative Study of Government and Private Senior Secondary Schools in Patna District

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ABSTRACT

This study investigates the influence of digital education on the academic performance of Government and private senior secondary school students in Patna district. Using data from urban and rural schools, it evaluates the role of digital tools, infrastructure, and teacher preparedness in shaping student outcomes. The research employs a mixed-methods approach, analysing academic records, conducting surveys with students and teachers, and interviewing school administrators. Findings indicate that digital education positively impacts student engagement and learning outcomes across both Government and private institutions. However, disparities exist in the accessibility and utilization of digital tools. Private schools demonstrated better access to advanced e-learning technologies, consistent internet connectivity, and trained educators. In contrast, Government schools, particularly in rural areas, faced challenges such as inadequate infrastructure, limited teacher training, and inconsistent power supply. The study highlights the need for targeted interventions to bridge these gaps. Recommendations include improving digital infrastructure in Government schools, implementing teacher training programs on e-learning methods, and fostering public-private partnerships to ensure equitable access to digital resources. By addressing these challenges, policymakers and educators can leverage digital education to create a more inclusive and effective learning environment in Patna district.

KEY WORDS

Digital Education, Academic Performance, Senior Secondary Schools, Digital Infrastructure, Teacher Training.

INTRODUCTION

Digital education has revolutionized the landscape of teaching and learning by introducing innovative tools that enhance student engagement and improve educational outcomes. The integration of technology into classrooms has allowed educators to move beyond traditional pedagogical methods, enabling personalized learning, interactive content delivery, and real-time assessment. Recognizing its transformative potential, the Indian Government launched initiatives such as *Digital India* and the introduction of smart classrooms to address the disparities in educational access and quality, particularly in underprivileged and rural areas.

Despite these advancements, the effectiveness of digital education varies significantly between Government and private schools. Factors such as differences in funding, infrastructure, teacher training, and student socioeconomic backgrounds create disparities in how these technologies are adopted and utilized. Government schools often face constraints such as inadequate digital infrastructure and limited access to trained educators, while private institutions tend to benefit from better resource allocation and administrative support.

This study focuses on the Patna district in Bihar, a region characterized by a diverse mix of urban and rural educational settings. The research aims to explore the impact of digital education on student academic achievement in senior secondary schools. It seeks to address the following research questions:

1. How does digital education influence academic achievement in Government and private senior secondary schools?
2. What are the primary challenges and opportunities in implementing digital education in Patna district?

By addressing these questions, the study aims to provide actionable insights to improve digital education practices and reduce inequities within the district.

Objectives of the Study

1. **Analyse the role of digital education in improving student achievement in Patna's senior secondary schools:** This objective focuses on assessing the extent to which digital tools and resources contribute to enhanced academic performance, better engagement, and overall learning outcomes in both Government and private institutions.
2. **Compare the accessibility and utilization of digital tools in Government and private institutions:** This objective examines the differences in access to and use of digital technologies between the two types of schools. It includes evaluating factors such as infrastructure, availability of devices, internet connectivity, and teacher proficiency in digital education.
3. **Identify challenges in implementing digital education in the district and propose actionable solutions:** This objective aims to uncover barriers such as resource constraints, inadequate training, or policy implementation gaps that hinder effective integration of digital education. It further seeks to suggest strategies to overcome these challenges, ensuring equitable and effective use of digital tools in education across Patna district.

Research Methodology

This study adopts a mixed-methods approach, integrating both quantitative and qualitative data to ensure a comprehensive analysis of the impact of digital education. The methodology includes data collection from a diverse sample, use of multiple tools, and an evaluation of key variables influencing academic achievement.

Sample

The study collected data from 40 senior secondary schools in Patna district, equally divided between Government and private institutions. Urban and rural schools were included to ensure representation.

Data Collection Tools

- Surveys:** Administered to students and teachers to assess access and utilization of digital education tools.
- Interviews:** Conducted with school administrators to understand infrastructure, policies, and challenges.
- Academic Records Analysis:** Academic performance data (test scores, pass rates) over three years were reviewed to identify trends.

Variables

- **Independent Variable:** Access to digital education (availability of smart classrooms, e-learning tools, and internet).
- **Dependent Variable:** Student academic achievement (measured by average test scores and pass rates).

Data Table: Sample Characteristics and Digital Education Access

Category	Government Schools	Private Schools	Total
Number of Schools	20	20	40
Urban Schools	10	12	22
Rural Schools	10	8	18
Schools with Smart Classrooms	8 (40%)	15 (75%)	23 (57.5%)
Schools with E-Learning Tools	12 (60%)	18 (90%)	30 (75%)
Internet Availability	10 (50%)	18 (90%)	28 (70%)

Data Table: Academic Achievement (Average Scores)

Category	Government Schools	Private Schools	Overall
Average Test Scores (Urban)	65%	78%	72%
Average Test Scores (Rural)	55%	70%	63%
Overall Pass Rates	68%	85%	76.5%

These tables illustrate differences in digital education access and its correlation with academic performance across Government and private schools in Patna district.

Findings and Discussion

1. Impact of Digital Education on Student Achievement

The integration of digital tools has positively influenced academic outcomes across both Government and private senior secondary schools in Patna district. Government schools equipped with functional digital tools witnessed a 15% increase in average test scores, highlighting the potential of technology to enhance learning. Private schools demonstrated even greater benefits due to higher integration of e-learning resources, which contributed to a 20% improvement in student engagement. These results suggest that digital education can significantly improve academic performance when adequately implemented.

2. Disparities in Digital Education Access

Access to digital education varied markedly between urban and rural areas, as well as between Government and private institutions. Urban schools, irrespective of type, benefited from better infrastructure, such as high-speed internet and advanced digital tools. In contrast, rural Government schools faced significant

challenges, including inadequate digital infrastructure, unreliable electricity, and limited internet access. Rural private schools performed moderately better but still lagged their urban counterparts. These disparities underline the digital divide and its impact on equitable education.

3. Teacher Preparedness and Training

Teacher training emerged as a critical factor influencing the effective implementation of digital education. Only 40% of teachers in Government schools reported receiving formal training in using digital tools, compared to 75% in private institutions. This lack of training in Government schools, particularly in rural areas, hindered the effective use of digital resources and limited their impact on student achievement. Enhancing teacher preparedness through targeted training programs could bridge this gap and improve outcomes.

Recommendations

1. Strengthening Infrastructure

Ensure the effective use of digital education tools, it is crucial to improve the infrastructure in Government schools, especially in rural areas. This includes ensuring a consistent and reliable electricity supply, as well as providing high-speed internet connectivity. Investment in physical infrastructure, such as smart classrooms and e-learning equipment, is necessary to create an environment conducive to digital learning.

2. Teacher Training Programs

A major barrier to the successful implementation of digital education in Government schools is the lack of adequate teacher training. Address this, comprehensive digital education training programs should be developed for educators, focusing on the use of technology in the classroom, e-learning tools, and creating digital content. Continuous professional development and workshops on the latest educational technologies will equip teachers to better integrate digital resources into their teaching methods.

3. Public-Private Partnerships

Collaboration between Government and private organizations can help bridge the resource gap in underfunded schools. Public-private partnerships (PPPs) can facilitate the sharing of resources, including infrastructure, technology, and expertise. Private companies can contribute by providing digital tools, internet services, or technical support to Government schools. These collaborations will not only enhance the quality of digital education but also ensure its sustainability.

4. Student Accessibility

Ensure that digital education benefits all students, it is essential to address the issue of accessibility, particularly for economically disadvantaged learners. Providing subsidized or loaned digital devices such as tablets or laptops, along with free or low-cost internet data plans, will help students from low-income families gain access to digital learning resources. Additionally, schools should offer digital literacy programs to ensure that students can effectively use these resources.

The effectiveness of digital education in Patna district can be significantly enhanced, ensuring a more equitable learning experience for all students.

CONCLUSION

Digital education has shown significant potential to improve academic achievement and enrich the learning experience, as demonstrated by the data from Government and private senior secondary schools in Patna district. The integration of digital tools has been linked to higher student engagement and better academic performance, particularly in private schools with more advanced infrastructure. However, disparities in access to digital education especially between urban and rural schools—remain a challenge. Government schools, particularly in rural areas, face issues such as unreliable internet, insufficient teacher training, and inadequate infrastructure.

Despite these challenges, the positive impact of digital education is clear. Government schools that utilized digital tools saw a 15% increase in average test scores, while private schools experienced a 20% improvement in student engagement and outcomes. These findings underscore the transformative potential of digital education but also highlight the need for targeted interventions to address the existing gaps.

Bridge these disparities, it is crucial to focus on strengthening infrastructure, enhancing teacher training programs, fostering public-private partnerships, and ensuring equitable access to digital resources for students from poor backgrounds. By taking these actions, Patna district can create a more inclusive and effective digital education system, ensuring that all students benefit from the opportunities digital learning offers.

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