Evaluating the Impact of the ICT @ Schools Program on Learning Experiences: A Study of Secondary Government Schools in Chikkaballapur Taluk, Karnataka

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Abstract

Information communication is vital to achieving educational objectives. It plays a critical role in implementing school programs and is very helpful for school administrators, teachers, and students. This study examines the impact of information communication on students' academic performance in secondary Government schools in Chikkaballapur Taluk. Secondary data was provided in the paper to support the study. This concludes that information communication technology (ICT) enhances students' academic performance, improves the learning experiences of students, and also enriches teaching practices, making the learning process more interactive and engaging.

The paper also shows the infrastructure disparity between urban and rural schools. It identifies the factors affecting students' learning experience, such as student computer ratio, internet connectivity, number of hours allocated for computer learning, etc. Moreover, the study explores how ICT influences the teaching practices of teachers. The challenges for ineffective implementation of ICT in schools were inadequate ICT facilities, poor implementation of ICT policies, unstable internet services, limited access to ICT tools, and poor ICT literacy among teachers and students. This study employs a mixed approach of qualitative and quantitative methods to evaluate the use of ICT tools by teachers and students. The random sample data combines 66 respondents from the Chikkaballapur taluk. The research uses the chi–square Test as a statistical method for data analysis. This study focuses on the ICT usage in secondary government schools and offers relevant suggestions for improvement.

Keywords: Government Secondary schools**,** ICT infrastructure and utilization, academic performance, Learning experiences, teaching practices.

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INTRODUCTION

Education plays a vital role in shaping the future of individuals and society. In today's world, technology is transforming how students learn and teachers teach. In the 21st century, the field of education is undergoing a transformational transition in the age of the digital revolution, with the growing use of social and digital media platforms.(Mehta & Yadav, 2024).

The Indian school education system is amongst the most renowned in the world. The school education system in India is vast and complex. It is overseen by three national bodies: The All-India Council for Technical Education, the University Grants Commission, and the National Council of Educational Research and Training. In addition to these, each state has its department or Ministry of Education, which regulates school education within its jurisdiction.

The Survey highlights that India's school education system serves 24.8 crore students across 14.72 lakh schools with 98 lakh teachers (UDISE+ 2023-24). Government schools comprise 69 % of the total, enrolling 50 % of students and employing 51 % of teachers, while private schools account for 22.5 %, enrolling 32.6 % of students and employing 38 % of teachers.

The government has launched the ICT at Schools Programme that aims to integrate Information and Communication Technology (ICT) into the education system to enhance teaching, learning, and administrative processes. It is implemented by governments, educational institutions, or non-governmental organizations for digital literacy and technology-enabled education in schools. The Scheme aims to bridge the digital divide amongst students of various socio-economic and other geographical barriers. The Scheme provides support to States/UTs to establish computer labs on a sustainable basis. So far, 87033 government and government-aided secondary and higher secondary schools have been approved for coverage under the ICT in Schools Scheme.

The ICT@School Scheme aims to make all students IT literate, helping to create a workforce with IT skills in the country. It focuses on integrating technology into teaching and learning. The scheme provides modern IT infrastructure in schools and plans to establish smart schools as role models, offering resources and support to nearby government schools. The core aim of the scheme is to train teachers in IT and help students develop IT skills, making it a dynamic and forward-thinking initiative.

Information and Communication Technology (ICT) includes computers, the Internet, and electronic delivery systems such as radios, televisions, and projectors, and is widely used in today's education field. ICT is being applied successfully in instruction, learning, and assessment. ICT is considered a powerful tool for educational change and reform. A well-designed ICT curriculum will help students develop IT skills. The scheme also promotes hiring full-time ICT teachers and encourages examination boards to include computer-related subjects as electives in higher secondary education. To ensure teachers are well-trained in ICT, the NCTE will provide pre-service training, and in-service ICT training will be encouraged. The development and regular use of e-content will be a key focus of the scheme. For smooth implementation, a structured management system will be set up at the national, state, and district levels for monitoring and evaluation. The core aim of the scheme is to train teachers in IT and help students develop IT skills, making it a dynamic and forward-thinking initiative.

This study concentrates on Chikkaballapur Taluk, the Chikkaballapur District. The main objective of this study is to examine how the ICT at Schools Program has improved the learning experiences and academic performance of students in the secondary schools in Chikkaballapur Taluk.

Motivation for the Study

In the digital era, integrating Information and Communication Technology (ICT) in education is no longer optional it is essential for enhancing student learning outcomes and preparing learners for the 21st-century knowledge economy. Despite national efforts like the ICT @ Schools program, rural and semi-urban regions, such as Chikkaballapur Taluk, face infrastructural, pedagogical, and awareness-related challenges. There exists a pressing need to evaluate whether ICT interventions are reaching students effectively and transforming classroom practices. Most existing studies focus on urban or generalized contexts, leaving a research gap in regional evaluations. This study is motivated by the desire to assess the real-world impact of ICT infrastructure and tools on students' learning experiences and teachers' instructional methods in government secondary schools. By identifying implementation gaps and measuring effectiveness, the research aims to support evidence-based improvements. It further contributes to digital inclusion policies and the goal of equitable quality education across geographic and socio-economic divides.

Literature Review:

The literature review highlights the effectiveness of integrating Teaching and learning with Technology, with an emphasis on the role of how Information and Communication Technology (ICT) integration has an impact on teaching and learning in schools, and also emphasizes the challenges faced by the school management. (Nadeem 2018) and (Singh & Kumari, 2023) Describes how ICT tools provide different ways to improve learning. Interactive simulations, videos, and online platforms help students learn in ways that suit them best, making lessons more engaging. With access to a wide range of online resources, students can explore topics independently and collaborate with others to build knowledge.

Swarali Sanjay Shah (2024) Analyses the effectiveness of integrating Teaching and learning with Technology, emphasizing the Key factors that contribute to successful technology-based education, including teachers' preparedness with ICT tools and facilities, as well as participation in professional development training programs. The study calls for a focus on the necessity for planning and policymaking to facilitate ICT integration in educational institutions.

(Jo Shan Fu, 2024) Addresses the benefits of ICT inclusion in schools, challenges encountered, factors that determine successful integration, teachers' attitudes, perceptions, and confidence levels while using ICT, and the role of school culture in ICT utilization. Similarly (Naji, 2017) Viewed the introduction of ICT in the classroom as a positive change, benefiting both groups and transforming their learning and teaching experiences.

In conclusion, the reviewed literature emphasizes the need to improve infrastructure, the effectiveness of integration, of ICT to enhance learning and teaching in schools. Address the challenges encountered in the implementation of ICT and call for relevant improvements in the schools.

Research Gap:

Even though there are certain studies, e.g., (Arora 2007) (Shah 2024), on ICT problems in schools, they are not specifically related to secondary government schools. Earlier research emphasizes the positive effect of ICT, but no particular study assesses ICT's effect on government schools in Chikkaballapur taluk, Karnataka.

This study estimates the learning experiences and levels of student engagement in utilizing ICT tools in government schools. It also examines what particular ICT-related challenges, e.g., internet connectivity,

teacher training, ICT tools, and maintenance, affect the effectiveness of ICT education in Chikkaballapur taluk.

Objectives of the study
1. To evaluate the accessibility and utilization of ICT infrastructure in secondary government schools under the ICT at Schools program.
2. To assess the impact of ICT tools on students' learning experiences and academic performance, and the teaching practices.
3. To identify challenges and suggest recommendations in implementing the ICT at Schools program in Chikkaballapur taluk.

Hypothesis:
Learning Experience (X1)
- Null Hypothesis (H0): There is no significant association between the use of TCT tools and the learning experiences of students.
- Alternative Hypothesis (H1): There is a significant association between the use of ICT tools and the learning experiences of students.

Teaching Practices (X2)
- Null Hypothesis (H0): There is no significant relationship between the use of ICT and teaching practices.
- Alternative Hypothesis (H1): There is a significant relationship between the effective use of ICT and teaching practices.

Methodology
This study employs a mixed-method research design, integrating both quantitative and qualitative approaches to evaluate the impact of the ICT @ Schools program on teaching and learning outcomes in secondary government schools of Chikkaballapur Taluk, Karnataka.

Study Area and Sampling Design
The study was conducted in Chikkaballapur Taluk, where several secondary government schools are covered under the ICT @ Schools scheme. To ensure a representative and unbiased sample, a stratified random sampling method was adopted. First, the population was stratified based on schools across the taluk. From these strata, a total of 66 respondents (44 students and 22 teachers) were selected randomly to ensure coverage of different schools and learning environments.

Primary Data Collection: Primary data were collected through structured and pre-tested questionnaires, specifically designed to gather information from both students and teachers. The student questionnaire focused on:
- Access to and usage of ICT tools (computers, projectors, internet),
- Perceptions on how ICT influences academic performance,
- Experiences related to engagement, collaboration, and conceptual understanding.

The teacher questionnaire explored:
- Utilization of ICT tools in daily teaching,
- Challenges faced in integrating ICT,

- Perceptions of ICT's impact on students' participation and outcomes. Both tools employed a **Likert scale** to capture perceptions and attitudes quantitatively.

Secondary Data Collection: *Secondary data were sourced from official records, reports, government portals (e.g., UDISE+, Ministry of Education), research journals, and existing literature on ICT implementation in Indian schools. This data provided contextual insights into the infrastructure, policies, and progress of ICT-based interventions in education.*

Data Analysis

The data collected were subjected to both **descriptive** and **inferential statistical analysis**:

- **Descriptive statistics** (percentages, frequencies) were used to summarize responses and generate insights into the accessibility and effectiveness of ICT tools.
- **Inferential statistics**, particularly the **Chi-square test**, were employed to test two key hypotheses:
1. The association between the use of ICT tools and students' learning experiences.
2. The relationship between ICT usage and changes in teaching practices.

The chi-square test helped determine the statistical significance of observed relationships between variables. The analysis was conducted using Microsoft Excel and SPSS. Results were interpreted in terms of significance (p-values), allowing the researchers to draw valid conclusions about the impact of ICT integration on school education in the selected region.

Results and Discussion:

Table 1: Students' Perception of the Effectiveness of ICT Tools in Enhancing Learning Experiences in Secondary Government Schools of Chikkaballapur Taluk

| Response Category	ICT tools make learning more engaging and interactive	ICT tools help in a better understanding of complex concepts	ICT has improved academic performance in your school	Teachers effectively utilize ICT tools in classrooms.	ICT tools promote collaborative learning among students
Strongly Agree (5)	20 (45.5%)	27 (61.4%)	17 (38.6%)	16 (36.4%)	22 (50.0%)
Agree (4)	18 (40.9%)	14 (31.8%)	20 (45.5%)	18 (40.9%)	16 (36.4%)
Neutral (3)	3 (6.8%)	2 (4.5%)	3 (6.8%)	6 (13.6%)	4 (9.1%)
Disagree (2)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Strongly Disagree (1)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total Responses	44 (100%)	44 (100%)	44 (100%)	44 (100%)	44 (100%)

Source: Collected by field Survey

The table shows the data about the students' perceptions of ICT tools in their learning experience, which depicts that 86.4% (Strongly Agree + Agree) of students believe ICT tools make learning more engaging and interactive, showing a positive impact. Better understanding of complex concepts – 93.2% of students agree that ICT tools help in grasping difficult subjects, making it the most positively rated category. While

84.1% of students acknowledge ICT's role in improving academic results, the agreement level is slightly lower compared to understanding concepts. Teachers' effectiveness with ICT – 77.3% believe teachers use ICT effectively, but the presence of 13.6% neutral responses suggests improvement in teacher training. Encouraging collaboration – Half of the students (50%) strongly agree that ICT fosters collaboration, and 86.4% agree overall, indicating that technology is promoting teamwork.

The findings show a positive attitude toward ICT in schools, indicating that it can boost engagement, understanding, and interaction. ICT does contribute to enhancing achievement, but its contribution significantly depends on teachers ' use of it. For it to reach its full potential, schools may have to incur costs in the form of teachers ' training assistance.

Graph No:1 Teachers' Perception: ICT Tools' Impact on Student Engagement and Effectiveness
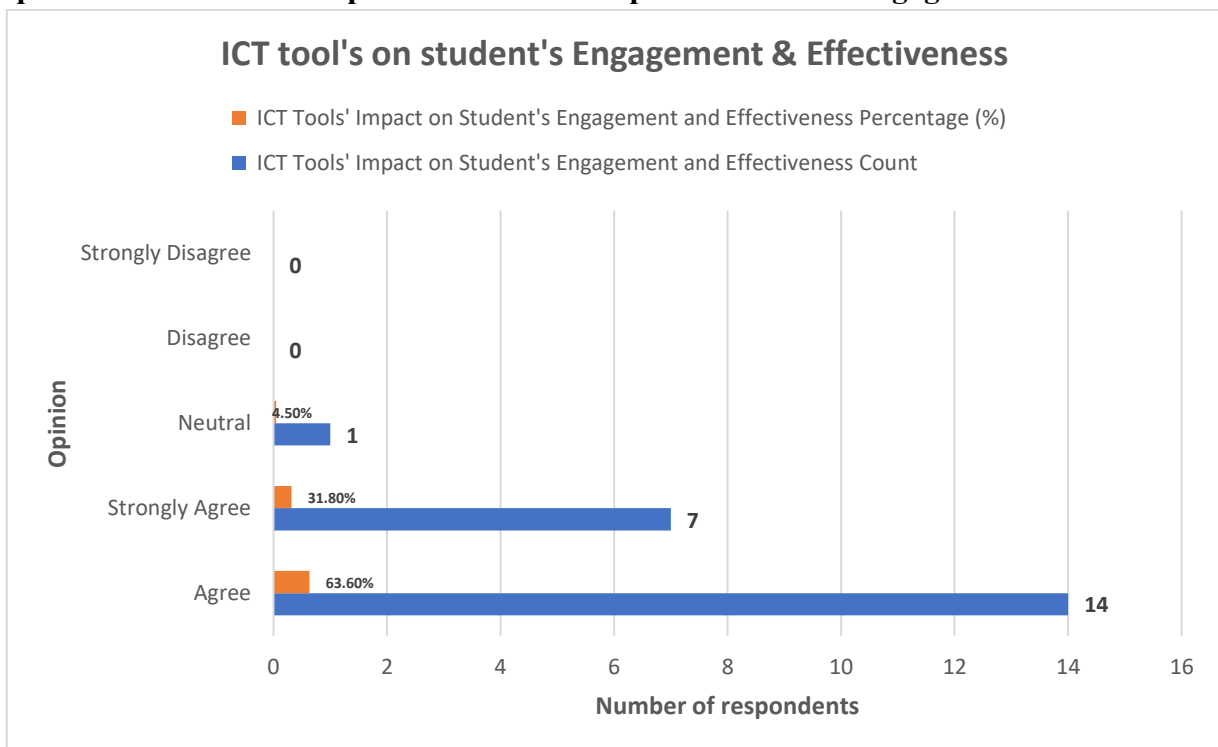
The bar chart visually represents the distribution of the teachers' opinions on the impact of ICT on students' engagement and effectiveness among students in different schools. It is shown that the highest response was 'Agreed' count (14 respondents, 63.6%), indicating that most participants were in favour of the statement. (7 respondents, 31.8%) 'Strongly agreed' that ICT tools help in improving their academics, reinforcing a strong positive sentiment. "Disagree" and "Strongly Disagree" had zero responses (0%), as everyone supported the statement that ICT tools have an impact on academic performance and student engagement in the class.

Inferential Statistics: Chi–Square Test
1) Learning Experience (X1)
Null Hypothesis (H0): There is no significant association between the use of TCT tools and the learning experiences of students.
Alternative Hypothesis (H1): There is a significant association between the use of ICT tools and the learning experiences of students.

Table No: 2 Results of The Chi-square Test

Hypothesis	Learning Experience
Chi-Square Statistic	15.04
Degrees of Freedom	1
P-Value	0.0001

Having done a Chi-Square test, the statistic value seems to be 15.04 with 1 degree of freedom, and a p-value of 0.0001. Since the p-value is significantly below the standard significance level of 0.05, the null hypothesis is rejected.

The Alternative Hypothesis (H0) is accepted as the p value is less than 0.05, indicating that there is a significant relationship between the use of ICT tools and enhanced learning experiences of students in secondary government schools in Chikkaballapur Taluk. It suggests that the effective integration of ICT tools, such as computers, projectors, and educational software, plays a crucial role in making learning more engaging, interactive, and comprehensive for students.

2) Teaching Practices (X2)

Null Hypothesis (H0): There is no significant relationship between the use of ICT tools and teaching practices.

Alternative Hypothesis (H1): There is a significant relationship between the use of ICT tools and teaching practices.

Table No 3: Results of the chi-square Test

Hypothesis	Teaching practices
Chi-Square Statistic	12.89
Degrees of Freedom	1
P-Value	0.0003

After applying the chi-square statistic, the results were found to be significant, as the static value seems to be 12.89 with 1 degree of freedom, and a p-value of 0.0003. Since the p-value is significantly below the standard significance level of 0.05, the null hypothesis is rejected.

The Alternative Hypothesis (H1) is accepted as the p value is less than 0.05, indicating that there is an association between the use of ICT tools and teaching practices. This outcome indicates that, within the sampled schools in Chikkaballapur Taluk, the integration of ICT tools has led to a statistically significant change in the teaching methodologies of the surveyed teachers. The presence and availability of ICT infrastructure, its adoption into schools, have translated into how educators conduct classroom activities or adopt pedagogies.

In summary, the analysis indicates that the implementation of ICT tools such as computers, projectors, smart TVs, and internet facilities positively impacts the learning experiences of students and also the way teachers conduct their lessons is influenced by the integration of digital tools, such as computers, projectors, online resources, and interactive learning platforms.

Conclusion:

The study concludes that integrating ICT tools significantly enhances both students' learning experiences

and teachers' teaching practices in secondary government schools in Chikkaballapur Taluk. Statistical analysis using the Chi-Square test confirms a strong positive association between ICT usage and educational effectiveness. The findings suggest that ICT tools, including computers, projectors, smart TVs, and internet resources, provide interactive and engaging learning environments that improve student understanding and participation.

However, despite these benefits, ICT implementation in government schools faces several challenges, including poor internet connectivity, lack of ICT infrastructure, insufficient teacher training, and inadequate ICT resources. To maximize the effectiveness of ICT in education, greater investments in infrastructure, teacher training programs, and student awareness initiatives are necessary.

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