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Digital Divide in Education: A Comparative Analysis of ICT Usage Between Government and Private Schools in Pune, Talegaon

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Abstract
The integration of Information and Communication Technology (ICT) has significantly transformed India's educational system, with schools nationwide adopting or upgrading to ICT infrastructure. Students increasingly rely on ICT for assignments, homework, and self-study. While private unaided schools in Maharashtra have advanced in embedding technology, government schools face challenges in equipping classrooms with basic digital tools, often lacking internet access, highlighting a digital divide (Nair, A. 2025, June 2). This study aims to find out and understand differences in the adoption, usage, and impact of ICT in the secondary level school students in government and private schools regarding digital initiative for fostering secondary education. The study conducts a comparative analysis of ICT usage for educational purposes among students in government and private schools in Pune. Utilizing a survey methodology, data was collected from 520 respondents across both school types, selected through purposive sampling. The findings aim to elucidate the extent of the digital divide and disparities in ICT utilization, offering insights into bridging gaps in educational technology access and application. The results indicate that while the frequency and duration of ICT usage are comparable between government and private school students, significant differences emerge in the perceived impact of ICT on learning efficiency. Private school students report a greater benefit from using ICT in their studies, suggesting that factors such as resource availability, training, and support may play a role in enhancing the effectiveness of ICT in education for private school students.

Keywords: Information and communication technology, digital divide

Introduction
The quick development of digital technology in the modern period has transformed education as well as many other facets of life. The "digital divide" is the difference between those who have access to and those who do not have access to contemporary ICT. This gap extends beyond just physical access to technology; it also includes the opportunities and abilities needed to use these tools efficiently. Addressing the digital divide is important because of its significant effects on economic prospects, social integration, and educational achievement. The digital gap can take many different forms in educational environments. It has an impact on students' capacity to engage in digital learning settings, access online resources, and acquire critical digital skills. When the COVID-19 pandemic hit the world these disparities, as schools and universities shifted to online learning, exacerbating the inequalities faced by students from disadvantaged backgrounds. This study focuses A Comparative Analysis of ICT Usage Between Government and Private Schools in Pune, India, examining the extent and implications of these disparities (Joshi, N.).
The term "digital divide" describes the difference between the social, racial, ethnic, and economic facets of society that have been systematically overlooked by the internet revolution and those that are fully enabled online. The difference between individuals who have effective access to digital and information technologies and those who have very little or no access is known as the "digital divide." It includes differences in physical access to technology as well as differences in the skills and resources needed to participate as a digital

citizen. Ani, Uchendu, and Atseye (2007) describe the digital divide as the difference between people who have access to modern ICT, such as computers, phones, the Internet, and related services, and those who do not. In contrast to Muir and Oppenheim (2002) [7], universal access is now primarily discussed in terms of the digital divide, which refers to the idea that a wealthy person in a major city would have access to the same amount and quality of information as a poor pensioner living in a remote location, at the same cost. Hence, the term digital divide is more than simply the gap between those who have, and those who do not have Internet access (Ukpebor, C. O., & Emojorho, D. (2012) [11].

Literature Review

The digital divide in education, is unequal access to and use of Information and Communication Technologies (ICTs), which impacts educational outcomes, particularly when comparing government and private schools. This literature review examines recent studies which will explore disparities in ICT access, infrastructure, skills, and usage between these school types, highlighting their implications for students and educators. The review draws on global perspectives, with a focus on socioeconomic, geographical, and institutional factors contributing to the divide.

ICT integration in education had commenced during the Cold War era, running through the wave of substantial government funding in the U.S., e.g., under the Vocational Education Act of 1963. After federal monies grew scarce, schools began to rely on local property taxes, thus widening the gap in resources existent between well-to-do private schools and underfunded public schools of typically poor neighbourhoods. Being in richer communities, private schools can give out better funding and equip world-class ICT infrastructure to their students, whereas government schools cannot do much with the limited resources at hand. Thus, this funding inequality creates and further sustains the unequal access to technology, which basically impacts learners' performance in school (American University, 2020).

With the onrush of the COVID-19 pandemic, the matter of bridging the digital divide for education came sharply into focus. Government schools especially faced the wrath of an underdeveloped digital infrastructure in developing countries. A 2023 study found that rural-government schools suffered lower rates of internet connectivity and device ownership than private schools, hence unequal learning opportunities. The study underlined the need for public-private partnerships to narrow down this gap as far as private schools enjoyed comparatively better access to digital platforms and resources (Khan & Qureshi, 2023) [4].

Significant disparities in ICT access and proficiency between faculty in public (government) and private universities were found in a Pakistani study; this pattern is probably relevant to educational institutions. Compared to their counterparts in government institutions, where resource limitations limited technology integration, faculty in private institutions reported greater physical access, motivation, and ICT proficiency. Because government school teachers frequently lack training and access to contemporary ICT tools, this disparity has an impact on the quality of instruction (Siddiqui & Memon, 2020) [9].

According to the 2018 Teaching and Learning International Survey (TALIS) and the International Computer and Information Literacy Study (ICILS), socioeconomic backgrounds have a significant impact on students' ICT proficiency, which is essential for digital education. Compared to government schools, private schools—which frequently serve students from higher socioeconomic backgrounds—offer superior instruction and access to ICT, leading to greater levels of digital readiness. However, individual student skills outweighed school-level infrastructure differences, indicating that government schools require focused interventions to improve student competencies (Fraillon *et al*., 2020) [2].

In government schools, where equitable distribution is hampered by resource limitations, gender differences in ICT access are more noticeable. Boys are more likely than girls to receive mobile phones, especially in low-income environments, according to a UNICEF study conducted in 41 countries. This has an effect on the academic performance and digital literacy of female students. Due to their greater funding, private schools frequently give all students equal access to technology, thereby closing the gender gap (UNICEF, 2021) [10].

In order to address the digital divide, government policies are essential. Private schools have benefited from early adoption of initiatives like South Korea's investment in broadband infrastructure, which has effectively decreased disparities. Government schools in developing nations like India, on the other hand, suffer from inefficient programs like BharatNet that are unable to provide dependable connectivity to rural areas. To improve ICT access in government schools, public-private partnerships and device subsidies are advised (Oxfam India, 2023).

Students in government schools perform worse academically because they have less access to ICT, which is a direct result of the digital divide. Gaps in internet and device access have a detrimental impact on secondary school enrollment and completion rates, especially in sub-Saharan African government schools, according to a 2024 study. Better resources are available at private schools.

ICT use is greatly influenced by teacher practices. Due to a lack of resources, teachers in government schools frequently use ICT to teach basic skills, but private schools use it to develop advanced literacy and cognitive abilities. In contrast to government schools, where inadequate infrastructure and training prevent successful integration, a 2005 study indicated that teacher attitudes and technological support in private schools predict higher student ICT usage (Kim & Bagaka, 2005) [5].

Methodology

Research Design

This study employs a quantitative research design to investigate the adoption, usage, and impact of Information and Communication Technology (ICT) among secondary-level students in government and private schools. A cross-sectional survey approach was utilized to collect data at a single point in time, allowing for the comparison of ICT-related behaviors and perceptions across different school types, genders, grades, and parental income levels.

Population and Sampling

Students in grades 9 through 12 who attended both public and private secondary schools in each area made up the target population. To guarantee representation from both school types, a stratified random sampling technique was

used. 524 students made up the sample size, of whom 128 (24.4%) attended government schools and 396 (75.6%) attended private ones. The greater number of private schools in the area is reflected in this distribution. Students from Grades 9 (47.1%), 10 (24.8%), 11 (8.6%), and 12 (19.5%) were included in the sample; 40.8% of respondents were female and 59.2% were male. To capture socioeconomic diversity, parental income levels were also considered.

Data Collection

A structured questionnaire that evaluated three main areas—the frequency and duration of ICT use for educational purposes, the amount of time spent on media for educational purposes, and the perceived influence of ICT on time management and learning efficiency—was used to gather data. The questionnaire used Likert-scale questions to gauge perceptions of impact (1 = Strongly Disagree, 5 = Strongly Agree), frequency (1 = Never, 5 = Very Frequently), duration (1 = Less than 1 year, 5 = More than 5 years), and time spent (1 = Less than 1 hour, 5 = More than 5 hours). To make sure it was reliable and clear, a small group of students pre-tested the questionnaire. Participants gave their informed consent, and school administrators approved the surveys, which were given out in person at schools.

Both descriptive and inferential statistical techniques were used to analyze the gathered data. The demographic characteristics (gender, school type, grade, and parental income) and ICT usage patterns were summarized using descriptive statistics, such as frequency tables, percentages, means, and standard deviations. The means of ICT adoption and impact variables were compared between students in government and private schools using independent samples t-tests. The assumption of equal variances was tested using Levene's Test for Equality of Variances, with adjustments made for unequal variances as needed. For every statistical test, a significance level of $p < 0.05$ was used. A statistical software program (such as SPSS or R) was used for data analysis to guarantee the precision and dependability of the findings.

Data Analysis

Interpretation of the frequency tables

Gender					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Male	310	59.2	59.2	59.2
	Female	214	40.8	40.8	100.0
	Total	524	100.0	100.0	

The data shows that out of the total 524 respondents, 310 (59.2%) are male and 214 (40.8%) are female. This indicates a higher representation of males in the sample compared to females. The cumulative percentage reveals that by adding the percentage of male respondents, 59.2% of the sample is male, and with the inclusion of female respondents, the total reaches 100%. This distribution suggests a gender imbalance, with a significantly larger proportion of males than females in the sample.

School type					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Government	128	24.4	24.4	24.4
	Private	396	75.6	75.6	100.0
	Total	524	100.0	100.0	

The data shows that out of the 524 respondents, 128 (24.4%) are from government schools, while 396 (75.6%) are from private schools. This indicates a significantly higher representation of students from private schools compared to those from government schools. The cumulative percentage reveals that after accounting for the students from government schools, 24.4% of the sample is from government schools, and with the inclusion of students from private schools, the total reaches 100%. This distribution highlights a substantial majority of respondents coming from private educational institutions.

Grade					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Grade 9	247	47.1	47.1	47.1
	Grade 10	130	24.8	24.8	71.9
	Grade 11	45	8.6	8.6	80.5
	Grade 12	102	19.5	19.5	100.0
	Total	524	100.0	100.0	

The data shows the distribution of respondents across different grades, with a total sample size of 524 students. Grade 9 has the highest frequency, with 247 students representing 47.1% of the sample, indicating a strong representation of this grade level. Grade 10 follows with 130 students, accounting for 24.8% of the participants. Grades 11 and 12 have significantly fewer respondents, with 45 (8.6%) and 102 (19.5%) students, respectively. Together, Grades 9 and 10 comprise 71.9% of the total sample, highlighting a focus on lower secondary education. The cumulative percentages show that all respondents belong to Grades 9 through 12, with Grade 12 completing the total at 100%. This distribution suggests that the majority of the sample consists of students in the earlier stages of secondary education, which may influence the findings related to ICT adoption and usage among these grades.

Monthly Income of the parent					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less Than 20,000	60	11.5	11.5	11.5
	20,000-30,000	55	10.5	10.5	21.9
	30,000-40,000	30	5.7	5.7	27.7
	40,000-50,000	78	14.9	14.9	42.6
	More than 50,000	301	57.4	57.4	100.0
	Total	524	100.0	100.0	

The data on the monthly income of parents reveals a significant concentration of respondents in the higher income brackets, with 57.4% earning more than 50,000. A notable proportion, 14.9%, falls within the 40,000-50,000 range, while smaller segments report incomes between

Adoption and Usage

Group Statistics					
	School type	N	Mean	Std. Deviation	Std. Error Mean
How frequently do you use Information and Communication Technology application for educational purposes?	Government	128	4.1953	1.29237	.11423
	Private	396	4.2803	1.18843	.05972
How long have you been using computer and its applications for learning purposes either at school or at home?	Government	128	2.6641	1.41018	.12464
	Private	396	2.7374	1.18928	.05976
How much time do you spend on any media for your educational purpose?	Government	128	2.0469	1.06379	.09403
	Private	396	1.9697	.91905	.04618

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
How frequently do you use Information and Communication Technology application for educational purposes?	Equal variances assumed	1.527	.217	-.688	522	.492	-.08499	.12349	-.32758	.15760
	Equal variances not assumed			-.659	201.084	.510	-.08499	.12890	-.33916	.16918
How long have you been using computer and its applications for learning purposes either at school or at home?	Equal variances assumed	10.598	.001	-.578	522	.563	-.07331	.12675	-.32232	.17569
	Equal variances not assumed			-.530	188.896	.596	-.07331	.13823	-.34599	.19936
How much time do you spend on any media for your educational purpose?	Equal variances assumed	2.097	.148	.794	522	.428	.07718	.09723	-.11383	.26819
	Equal variances not assumed			.737	192.077	.462	.07718	.10476	-.12944	.28380

Impact

Group Statistics					
	School type	N	Mean	Std. Deviation	Std. Error Mean
ICTs improved my efficiency of learning when I use them for the educational purpose.	Government	128	3.6094	1.07392	.09492
	Private	396	3.8611	.95116	.04780
ICTs help me to better manage my time in studies.	Government	128	3.3750	1.20367	.10639
	Private	396	3.5253	.99205	.04985
ICTs improved my efficiency of learning when I use them for educational purposes.	Government	128	3.4609	1.12174	.09915
	Private	396	3.7323	.99826	.05016

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
ICTs improved my efficiency of learning when I use them for the educational purpose.	Equal variances assumed	8.566	.004	-2.520	522	.012	-.25174	.09989	-.44797	-.05550
	Equal variances not assumed			-2.369	195.528	.019	-.25174	.10628	-.46133	-.04214
ICTs help me to better manage my time in studies.	Equal variances assumed	10.925	.001	-1.411	522	.159	-.15025	.10650	-.35948	.05897
	Equal variances not assumed			-1.279	186.010	.203	-.15025	.11749	-.38204	.08153
ICTs improved my efficiency of learning when I use them for educational purposes.	Equal variances assumed	9.024	.003	-2.592	522	.010	-.27139	.10469	-.47705	-.06572
	Equal variances not assumed			-2.442	196.209	.015	-.27139	.11112	-.49052	-.05225

The objective of this study is to understand the differences in the adoption, usage, and impact of Information and Communication Technology (ICT) among secondary-level school students in government and private schools. The data analysis reveals significant insights regarding both the adoption and impact of ICT in education.

1. Adoption and Usage

- **Frequency of ICT Use**

a) Group Statistics: The mean frequency of ICT application usage for educational purposes among government school students (M = 4.20) is slightly lower than that of private school students (M = 4.28). The standard deviations indicate variability in usage, with government school students showing slightly more variability.

b) Independent Samples Test: The t-test results indicate no significant difference in the frequency of ICT use between the two school types (t(522) = -0.688, p = 0.492). This suggests that both government and private school students utilize ICT at comparable frequencies for educational purposes.

- **Duration of ICT Usage**

a) Group Statistics: The mean duration of using computers and applications for learning is slightly lower for government school students (M = 2.66) compared to private school students (M = 2.74). The standard deviations indicate that private school students have a more consistent usage duration.

b) Independent Samples Test: The t-test results show no significant difference in the duration of ICT usage (t(522) = -0.578, p = 0.563), indicating that both groups have similar experiences in terms of how long they have used computers for educational purposes.

- **Time Spent on Media for Education**

a) Group Statistics: Government school students report spending an average of 2.05 hours on media for educational purposes, while private school students report spending slightly less time (M = 1.97).

b) Independent Samples Test: The results indicate no significant difference in time spent on media for educational purposes (t(522) = 0.794, p = 0.428), suggesting that both groups allocate similar amounts of time to media use in their studies.

2. Impact of ICT

- **Improvement in Learning Efficiency**

a) Group Statistics: The mean score for government school students (M = 3.61) is lower than that of private school students (M = 3.86), indicating that private school students perceive ICT to have a greater positive impact on their learning efficiency.

b) Independent Samples Test: The t-test shows a significant difference (t(522) = -2.520, p = 0.012), suggesting that private school students find ICT more beneficial for enhancing their learning efficiency compared to their government school counterparts.

- **Time Management in Studies**

a) Group Statistics: Government school students reported a mean score of 3.38, while private school students reported 3.53. This indicates a slight difference in perceptions of how well ICT helps manage study time.

b) Independent Samples Test: The t-test results reveal no significant difference (t(522) = -1.411, p = 0.159), indicating that both groups similarly perceive the role of ICT in managing study time.

- **Overall Learning Efficiency**

a) Group Statistics: Government school students scored a mean of 3.46, whereas private school students scored 3.73, suggesting a more favorable view of ICT among private school students regarding its overall impact on learning.

b) Independent Samples Test: The t-test results confirm a significant difference (t(522) = -2.592, p = 0.010), reinforcing that private school students perceive a greater improvement in learning efficiency when using ICT for educational purposes.

Conclusion

In conclusion, the results indicate that while the frequency and duration of ICT usage are comparable between government and private school students, significant differences emerge in the perceived impact of ICT on learning efficiency. Private school students report a greater benefit from using ICT in their studies, suggesting that

factors such as resource availability, training, and support may play a role in enhancing the effectiveness of ICT in education for private school students.

These findings underline the importance of targeted interventions and resource allocation to improve the adoption and impact of ICT in government schools, ultimately fostering better educational outcomes.

Limitation

The study's findings are limited to the sampled population and may not be generalizable to other regions or educational contexts. Self-reported data may be subject to response bias, and the cross-sectional design limits the ability to infer causality. Additionally, the disproportionate representation of private school students may influence the results, reflecting the regional distribution of school types.

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