

Nature of Digital Divide Prevailing in Rural Schools in Ranipet District - Hindering AI Adoption in Schools

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Abstract: *In reality ICT awareness among students and teachers in Tamil Nadu varies significantly. The prevailing digital gap related to the awareness and accessibility of ICT facilities directly impacts the adoption of advanced tools like AIED by the teachers serving in different categories of schools. This research work aims to examine teachers' perceptions towards the nature of digital infrastructure prevailing in the schools and the nature of digital divide prevailing among different categories of schools functioning in Ranipet district in Tamil Nadu. The research work adopted an exploratory and explanatory methodology in the conduct of the study. A structured quantitative survey was conducted among 230 schoolteachers out of 456 total teachers from diverse institutional settings, including Government and private schools functioning in urban, rural, and semi-urban areas in Ranipet district. Data assessed reveal that not all schools surveyed are fully digitalized. Schools functioning in Ranipet district are found to be partially digitalized, and it may cause issues while the schools plan to adopt advanced AI tools in their schools. Thus, these schools are suggested to equip themselves with the needed infrastructure facilities to become techno-savvy in all senses. As the school authorities should realize the fact that inadequate ICT infrastructure in schools, it will lead to AI tools being underutilized, limiting their benefits that teachers and students could realize in their learning environments.*

Keywords: Information Communication Technology, Artificial Intelligence, ITC Infrastructure

1. Introduction

Digital literacy is a foundational requirement for adopting modern technologies, including AI (Artificial Intelligence). In rural Tamil Nadu, both teachers and students face significant obstacles in acquiring basic digital skills. Digital literacy plays a crucial role in enabling the use of educational technologies as a strong foundation through effective use of digital tools that support in AI-driven innovations in school education. The current state of digital infrastructure in schools plays a crucial role in supporting AIED technologies. Digital infrastructure (building modern labs, libraries, and digital resources) helps teachers in creating quality educational content, enhancing learning experiences, improving teacher training, aiding evaluation processes, stressing the need for professional development and effective use of technology in teaching and learning practices. In reality ICT awareness among student and teachers in Tamil Nadu varies significantly depending on gender of the teachers, their digital literacy level and regional location of the school. The prevailing digital gap related to the awareness and accessibility of ICT facilities directly impacts the adoption of advanced tools like AIED by the teachers serving in different categories of schools.

Inspiration for Conduct of the Research Work and Theme

Tamil Nadu has been at the forefront of education reform in India, pioneering Information and Communications Technology (ICT)-based learning, smart classrooms, and e-learning platforms over the last two decades. The state education policy envisions an AI-integrated education system where students learn problem-solving, critical

thinking, and computational skills from an early stage. In spite of the active education policies drafted by state Government of India, to date urban schools in cities like Chennai and Coimbatore have access to high-speed internet, smart boards, and AI-driven assessment tools, rural schools continue to struggle with poor connectivity, outdated computers, and insufficient digital resources.

A 2019 survey on digital learning in Tamil Nadu found that over 60 per cent of rural schools lacked proper IT infrastructure, making AI adoption a challenge. In addition, teachers play a crucial role in AI integration, yet many lack digital competency. The effectiveness of AI in education depends not just on infrastructure but also on teachers' ability to use AI tools effectively. Studies indicate that many teachers, especially in government schools, lack formal training in AI-based education. Without proper training, AI tools may remain underutilized, limiting their impact on students' learning environment.

Furthermore it was observed that not all schools are equally prepared to use these advanced tools, especially in areas like Ranipet with limited resources. This research work aims to examine teachers' perceptions towards the nature of digital infrastructure prevailing in the schools and the nature of digital divide that prevails among different categories of schools functioning in Ranipet district in Tamil Nadu.

2. Literature Assessment and Discussion

Literature discussing the ICT infrastructure status in schools, its impact and benefits are discussed beneath.

Manisha (2014) documented the fact that in the 21st century ICT is considered as a very important medium in the growth and development of education in India. Literature analysis made by Pall and Batra (2016) attempted to examine the ICT adoption in schools and its usage in offering classroom instruction i.e., learning, skill development and in enhancing students' learning skills through effective design of pedagogy. Srikant and Aggarwal (2017) claim that digitally trained teachers encourage their students to adopt and interact with the use of computer-based technology i.e., pedagogy development, provide unique experiences of learning and offer experiences in offering of learning new concept, involve themselves in experiment and innovation. Raja and Nagasubramani (2018) throw light that computer use in schools have facilitated the students to understand concept virtually, be able to understand the concepts in graphical representation, conduct video-conferences and make students more interactive in classes.

Kaur (2019) teachers revealed that ICT adoption differs in different categories of schools i.e., private and Government schools. Private schools are observed to be well equipped with ICT adoption that in turn enhance students learning in these schools, whereas only few Government schools are using ICT in imparting skills and knowledge to the students and few schools does not have well trained computer teacher(s). Adhya and Panda (2022) concluded that teachers are influenced by the merits of TEL Technology Enabled Learning) i.e., open to various resources, multimedia-based teaching and support teachers to strengthen the skills among the learners, especially after the Covid-pandemic lockdown period. Saha's (2023) study provided a deep understanding that the with adoption ICT in school education students can experiences an innovative learning, get access to quality education, facilitate e-learning from anywhere and around the clock. ICT also enhances the teaching efficacy of the teachers, enhances their communication ability, data management and access to various resources that supports their teaching. Sebastian et al., (2024) summarised that well-planned, organised and smart technology adoption in school education has positive impact of the learning and outcome of the students.

Furthermore, Kumar et al. (2022) highlight systemic disparities in digital access for rural Indian students, emphasizing infrastructure gaps and policy inertia. Bhattacharjee and Deb (2021) identify teacher resistance, electricity shortages, and inadequate training as key barriers to ICT adoption in rural Indian schools.

Philip and Gupta (2020) argue that teacher training must precede AI tool deployment to avoid techno-solutions in low-resource classrooms. Singh and Bangay (2023) propose localized infrastructure partnerships (e.g., NGOs + state governments) to address connectivity gaps in rural India. Majumdar and Muralidharan (2021) demonstrate that structured ICT training improves teacher confidence and student outcomes in Tamil Nadu's government schools.

Literature assessment supported the researcher in understanding the process of ICT adoption in school

education and it became a strong platform in the smooth adoption of AI. Through the process of literature assessment researcher realised that not much research studies are carried out among Indian school education system in embrace AI or level of ICT infrastructure build in schools. This identified research dearth facilitated the conduct of this empirical research work. The primary aim of this research is to explore the level of understanding among teachers in Ranipet District regarding the digital infrastructure present in their schools.

Methodology and Design of the Article

The research work adopted an exploratory and explanatory methodology in the conduct of the study. Thus, the study adopted both qualitative (secondary data and theory analysis) and quantitative data analysis techniques (measurement and statistical analysis). The study applied a judgmental sampling technique for selection of sample schools and for selection of the sample teachers. A structured quantitative survey was conducted among 230 schoolteachers out of 456 total teachers from diverse institutional settings, including Government and private schools functioning in urban, rural, and semi-urban areas in Ranipet district.

3. Results and Discussion

Through the data analysis it was inferred that the majority i.e., 84.78 per cent of school teachers,' are women, 32.61 per cent of them are aged less than 30 years and 22.17 per cent of teachers are M.Sc., M.Ed. qualified. It has been observed that majority i.e., 70 per cent of teachers are serving in private institutions, 74.35 per cent of teachers are adopting the state Board schools syllabus, and 28.26 per cent of respondents are serving in high school. The study found that 93.04 per cent of teachers work in English -medium schools, 66.96 per cent of the school located in urban region and 32.17 per cent of the sample had gathered 26 years and more experience in teaching. On the whole 60 per cent of the schools are found to be partially digitalised in this district and 80.43 per cent of the teachers opined that their school is digitalised adequately. Through data analysis it has been inferred that schools functioning in Ranipet district is equipped with various digital infrastructure for the past three years and more period (39.13 per cent) and for the past two years (36.09 per cent).

Teachers opine that the digital learning tools are used in their schools for: developing numeric skills among the students (81.60 per cent), in teaching as virtual learning (76.60 per cent), in aptitude development (73.40 per cent), to develop intelligent quotient (IQ) among the learners (69.80 per cent) and in various skill development (69.60 per cent). At the same time they understand that digital tools offer them support in data management (81.80 per cent), in class handling with scientist outlook (80.60 per cent), in measuring learners intelligent, performance and ability (77.20 per cent), in questioning and assessing students' performance (74.20 per cent) and support in pedagogy framing (68.60 per cent).

Table 1: Nature of Digitalisation Infrastructure Exists in School

Sl. No	Variables	Available	Not Available	Total
1.	Computer Lab	214(93.04)	16(6.96)	230(100)
2.	Hi-Teach Lab	78(33.91)	152(66.09)	230(100)
3.	Smart Board in Class-Rooms	192(83.48)	38(16.52)	230(100)
4.	Access to Broad-Band Service/Internet	194(84.35)	36(15.65)	230(100)
5.	Visual Learning Platform	206(89.57)	24(10.43)	230(100)
6.	Teacher has Access to Tablets	63(27.39)	167(72.61)	230(100)
7.	Adequate Technical Staff	197(85.65)	33(14.35)	230(100)
8.	Computer Teacher(s)	185(80.43)	45(19.57)	230(100)

Source: Primary Data

Digital infrastructure status of the sample schools was noted to have: computer lab (93.04 per cent), hi-tech lab (33.91 per cent), smart boards in class rooms (83.48 per cent), access to broadband service/internet (84.35 per cent), visual learning platform (89.57 per cent), teachers' have access to tablets

(27.39 per cent), adequate technical staff (85.65 per cent) and computer teacher(s) (80.43 per cent).

H₀: School-teachers' understanding on the nature of digital infrastructure that prevails in their school differs according to the board of study they currently serve.

Table 2: Measure of Dispersion and Anova Test Nature of Ownership of School Vs. Digital Infrastructure Prevailing in the School

Variables	State Government		Central Government		Private		Aided Private		F Value	Sig
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Computer Lab	4.053	0.848	4.083	0.881	4.043	0.861	4.077	0.891	10.023	.005
Hi-Teach Lab	4.053	0.911	3.792	0.833	3.814	0.800	3.923	0.744	10.616	.005
Smart Board in Class Rooms	4.158	0.602	3.625	0.770	3.615	0.725	3.500	0.860	13.496	.016
Access to Broad-Band Service/Internet	4.105	0.459	3.458	1.021	3.590	0.877	3.769	0.863	12.554	.006
Visual Learning Platform	3.684	0.946	3.417	1.100	3.416	1.076	3.423	1.027	10.367	.007
Teacher have Access to Tablets	3.684	0.820	3.500	0.834	3.460	0.837	3.423	0.945	10.442	.023
Adequate Technical Staff	3.579	0.902	3.250	0.989	3.236	0.905	3.192	1.021	10.833	.047
Computer Teacher(s)	3.632	0.684	3.583	0.974	3.590	0.862	3.654	1.018	10.050	.005

Level of Significance: 5 per cent

Data assessment reveals that valid information was provided indicating that State Government schools are well-equipped with various digital infrastructure facilities on par with any private schools functioning in the Ranipet district. In accordance with the above made conclusion, it has been found that the computed one-way ANOVA test values: 10.023, 10.616, 13.496, 12.554, 10.367, 10.442, 10.833 and 10.050 are found to be significant at 5 per cent. Hence, the hypothesis is accepted and it has been confirmed that school

teachers' understanding on the nature of digital infrastructure prevailing in their school differs according to the category of the school in which they are currently serving.

H₀: School-teachers understanding on the nature of digital infrastructure prevailing in their school differs according to the board of study they currently serve.

Table 3: Measure of Dispersion and Anova Test Syllabus Pattern Vs. Digital Infrastructure Prevailing in the School

Variables	State Board		Central Board		ICSE		IB		F Value	Sig
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Computer Lab	3.966	0.823	4.105	0.875	4.076	0.868	4.000	0.816	10.394	.013
Hi-Teach Lab	3.854	0.772	3.793	0.861	3.842	0.958	3.500	0.577	10.280	.001
Smart Board in Class Rooms	4.000	0.667	3.655	0.814	3.596	0.740	3.250	0.500	12.352	.005
Access to Broad-Band Service/Internet	3.789	0.713	3.621	0.903	3.620	0.889	3.000	0.816	11.286	.026
Visual Learning Platform	3.526	1.020	3.345	0.936	3.468	1.092	2.500	0.577	10.907	.041
Teacher have Access to Tablets	3.552	0.827	3.684	0.749	3.444	0.862	2.750	0.500	11.515	.019
Adequate Technical Staff	3.257	0.897	3.241	1.091	3.211	0.976	2.750	0.500	11.049	.033
Computer Teacher(s)	3.608	0.884	3.586	0.983	3.579	0.769	3.250	0.500	10.196	.041

Level of Significance: 5 per cent

Cross-sectional mean score comparison reveals that state board syllabus has well-built digital infrastructure as per the teachers' opinion. The computed one-way ANOVA test values: 10.394, 10.280, 12.352, 11.286, 10.907, 11.515, 11.049 and 10.196 are found to be significant at 5 per cent. Therefore, the hypothesis is accepted and it has been declared that school-teachers' understanding of the nature of

digital infrastructure that prevails in their school differ according to the board of study they currently serve.

H₀: School-teachers understanding on the nature of digital infrastructure prevails in their school differs according to the grade of schooling study they serve.

Table 4: Measure of Dispersion and Anova Test Grade of Schooling Vs Digital Infrastructure Prevail in the School

Variables	Primary		Secondary		High School		Higher Secondary		F Value	Sig
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Computer Lab	4.230	0.844	4.089	0.848	3.892	0.831	4.017	0.900	11.689	.010
Hi-Teach Lab	4.000	0.730	3.800	0.815	3.769	0.844	3.797	0.826	11.065	.035
Smart Board in Class Rooms	3.644	0.773	3.689	0.765	3.677	0.731	3.576	0.747	10.270	.047
Access to Broad-Band Service/Internet	3.511	0.869	3.610	0.871	3.600	0.965	3.803	0.771	11.105	.048
Visual Learning Platform	3.422	1.055	3.623	1.113	3.262	0.940	3.458	1.119	11.236	.027
Teacher have Access to Tablets	3.333	0.769	3.492	0.878	3.462	0.885	3.590	0.824	10.810	.040
Adequate Technical Staff	3.111	0.745	3.328	0.961	3.369	1.069	3.186	0.840	10.922	.031
Computer Teacher(s)	3.533	0.869	3.672	0.889	3.646	0.874	3.525	0.878	10.425	.035

Level of Significance: 5 per cent

Irrespective of schools' grade, each school is found to be digitally equipped in one aspect or another. In application to this discussion, the computed one-way ANOVA test values: 11.689, 11.065, 10.270, 11.105, 11.236, 10.810, 10.922 and 10.425 are found to be significant at the 5 per cent level. Hence, the hypothesis is accepted and it has been concluded that school-teachers' understanding on the nature of digital infrastructure that prevails in their school differs according to the grade of schooling in which study they serve.

4. Findings and Conclusion

Data assessed reveal that not all schools surveyed are fully digitized. Schools functioning in Ranipet district are found to be partially digitalised and ,it may cause issues when the schools plan to adopt advanced AI tools in their schools. Thus, these schools are advised to equip themselves with the needed infrastructure facilities to become techno-savvy in all senses. The school authorities should realize the fact that inadequate ICT infrastructure in schools, will lead to AI tools being underutilized, limiting their benefits that teachers and students could realize in their learning environments. Adoption of AIED supports the Government of Tamil Nadu minimise its spending on paying huge salaries to Government and aided school teachers, who form large-portion of tax collected by the state.

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