Digital Initiatives and Digital Infrastructure: A Study Among Secondary School Teachers in Nagaland

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***Abstract*—**This study aimed to assess secondary school teachers' awareness of digital initiatives and evaluate digital infrastructure availability in secondary schools of Nagaland. A survey research design was employed, involving 200 tribal teachers from 20 secondary schools in Kohima district. A self-developed survey questionnaire, Digital Initiatives Awareness and Digital Infrastructure (DADI), was validated through content and face validity. The findings revealed a significant gap in digital infrastructure, with poor internet connectivity and inadequate classroom infrastructure. While some digital initiatives like DIKSHA, e-Pathasala, and SWAYAM MOOCS had high awareness levels, others like National Test Abhyaas and NATIONAL DIGITAL LIBRARY had low awareness levels. The study also found that smartphones with internet connectivity and electricity were widely available in schools. The study suggests that more promotion and awareness are needed to achieve the intended goals of digital initiatives. The findings highlight the need for increased investment in digital infrastructure and targeted initiatives to bridge the digital divide and enhance teaching-learning processes. The results can inform policymakers and educators in developing strategies to promote the effective integration of ICT tools and enhance learning outcomes.

***Index Terms*—** Digital Initiatives, Digital Infrastructure, National Digital Education Architecture, Awareness & Availability

I. INTRODUCTION

The National Education Policy 2020 (NEP 2020) aims to achieve universal access to quality education in India over the next 20 years. This vision requires the development of digital infrastructure and the effective use of technology to enhance learning outcomes. The policy aligns with the United Nations Sustainable Development Goal 4, which emphasizes inclusive and equitable quality education for all. The National Digital Education Architecture (NDEAR) aims to create a digital infrastructure for school education in India (DoSEL, MoE, GoI, 2021). Digital initiatives have been launched to enhance education quality, bridge the digital divide, and provide equal access to education (Thankachan et al., 2020). The Indian government's 'Digital India' initiative seeks to create a digitally empowered society and knowledge-based economy by promoting digital access, inclusion, and empowerment (PIB, 2023). To achieve this vision, the Ministry of Education offers high-quality educational programs through DTH channels and web platforms under the PM e-Vidya initiative (PIB, 2023).

Digital infrastructure in education encompasses tools and systems that enable digital learning, including devices, the internet, and online platforms (Ministry of Education, Govt. of India). Key initiatives include DIKSHA, e-Pathshala, SWAYAM, PM e-VIDYA, SWAYAM Prabha, and NISHTHA, which provide digital resources, online courses, and teacher training to enhance education quality and accessibility (Ministry of Education, Govt. of India; NCERT). Effective ICT infrastructure supports knowledge building, problem-solving, and collaboration (Giordano, 2007; Kimanzi et al., 2018), creating learner-centered environments that enhance content and facilitate skill acquisition (UNESCO, 2008).

In Nagaland, the government has launched several digital initiatives to improve school education, including NECTAR, SMILE App, TabLab, iPrep Digital Library, and partnerships with NagaEd and Embibe (Shanvas, C). These initiatives aim to enhance digital infrastructure, improve teaching and learning, and provide

personalized learning experiences for students. Digital initiatives in Nagaland aim to enhance administrative efficiency, provide teachers with digital resources, and bridge the digital divide (Government of Nagaland). By leveraging digital resources, teachers can develop new skills and provide personalized support, leading to better student outcomes.

II. RESEARCH OBJECTIVES

1. To assess the awareness of digital initiatives by the Government of India and Government of Nagaland among secondary school teachers.
2. To evaluate the availability and accessibility of digital infrastructure in secondary schools in Nagaland.
3. To identify the gaps in digital literacy and infrastructure in secondary schools in Nagaland.

III. RESEARCH QUESTIONS

1. What is the level of awareness among secondary school teachers in Nagaland about digital initiatives by the Government of India and Government of Nagaland?
2. Which digital initiatives are most widely used by secondary school teachers in Nagaland?
3. What is the availability of digital infrastructure (e.g., computers, internet, smart boards, etc.) in secondary schools in Nagaland?

IV. REVIEW OF RELATED LITERATURE

***Awareness of Digital Initiatives*:** The significance of assessing ICT opportunities from a student's perspective lies in identifying key areas where technology has a profound impact, such as learning, research, employment, and social interaction (Madlela & B, 2020). In Nagaland, ICT-based education faces challenges like inadequate infrastructure, high internet costs, and limited computer skills (Sukhalu, 2021). To address these issues, the Department of School Education in Nagaland has introduced initiatives like the Nagaland Education Management & Information System (NEMIS) and the E-Classroom Program to enhance digital infrastructure and governance in schools (Sukhalu, 2021). Research highlights the need for a comprehensive ICT policy to cater to student requirements and bridge the digital divide in Nagaland (Madlela & B, 2020). Successful online digital education initiatives in Nagaland have leveraged social media platforms and online programs, such as the Tele/Online Education Programme during the COVID-19 lockdown (Nexus of Good). In contrast, states like Kerala have implemented ICT-enabled education programs, such as the Hi-Tech school program, which upgrades classrooms to international standards (Thankachan et al., 2020). Similarly, Andhra Pradesh has launched digital initiatives, including interactive flat panels, smart TVs, and personalized learning labs, to enhance education quality (NIEPA-NCSLA, 2023). In Nagaland, the Department of School Education has taken steps to prepare for online education, including setting up video recording studios, creating lesson videos, and utilizing social media platforms like YouTube and Facebook (Shanvas). The department's efforts have reached a significant audience, with the YouTube channel gaining over 16,800 subscribers and the Facebook page having 6,300 followers (Shanvas). These initiatives demonstrate the potential of digital education to enhance learning outcomes and bridge the digital divide in Nagaland.

Availability of Digital Infrastructure: Research highlights a pressing need for cybersecurity education and training programs in Nagaland's schools due to a severe shortage of trained teachers (Thankachan et al., 2020). A study in Dimapur, Nagaland, underscores the importance of adequate infrastructure and opportunities for effective ICT-based education implementation. Notably, 92% of teachers reported having access to digital devices, and a significant percentage use computers, internet, and smartphones daily for teaching and learning (Thankachan et al., 2020). National data reveals that only 57.2% of Indian schools have functional computers, and 53.9% have internet access, highlighting persistent digital infrastructure challenges (MoE, GoI, UDISE+, 2023-24). In contrast, initiatives like DIKSHA have achieved significant milestones, with over 524 crore learning sessions and 6,125 crore learning minutes recorded (PIB, 2023). The platform offers quality e-content, including QR-coded textbooks and 3,17,496 pieces of live e-content (PIB, 2023). Studies show a gradual increase in computer availability in Indian schools, from 26.4% in 2014-15 to 47.51% in 2021-22,

although many computers are non-functional (Kumar et al., 2024). In Nagaland, only 54% of schools have functional computers, with significant disparities between government and private schools (Pritam & Shaikh, 2024). Similarly, a study in Jorhat district, Assam, found that while many teachers own smartphones, few use them for teaching-learning processes (Sarma & Raju, 2022). International research also highlights the correlation between digital infrastructure availability and accreditation outcomes, with urban schools generally outperforming suburban schools (Supardi et al., 2024). A study in another region found that many secondary schools lacked ICT facilities, hindering their use in teaching and learning activities (Bariu, 2020). These findings emphasize the need for improved digital infrastructure and targeted initiatives to bridge the gap between government and private schools.

Gap spotting: The literature reveals several gaps that need attention. A significant gap exists in digital infrastructure, with poor internet connectivity and lack of proper infrastructure in classrooms hindering the effective integration of ICT tools (Sarma & Raju, 2022). Systemic inequities in digital access also influence accreditation outcomes, emphasizing the need for targeted policies to bridge the digital divide (Supardi et al., 2024). Furthermore, a shortage of ICT-trained teachers and personnel, coupled with limited literacy skills among teachers, affects the application of ICT in instruction (Pelgrum & Law, 2003). Continuous teacher training is essential to empower educators to integrate digital tools pedagogically and effectively into their practices (Pelgrum & Law, 2003). Moreover, many learners, families, and communities lack access to reliable, high-speed broadband and technology tools, highlighting the need for targeted interventions to enhance digital infrastructure in less-equipped schools and promote equitable educational opportunities (MoE, GoI, 2021). Addressing these gaps is crucial to ensure that digital initiatives in Nagaland's schools are effective and inclusive.

V. NEED OF THE STUDY

The present study is crucial for enhancing teacher digital literacy, which is vital for effective integration of technology in classrooms and can lead to improved student outcomes and academic performance. Understanding the awareness of Nagaland's state-specific digital initiatives, such as the Nagaland Education Management & Information System (NEMIS) and the E-Classroom Programme, on secondary school teachers can help refine and improve digital education in the state. Additionally, assessing the awareness of the Indian government's digital initiatives for school education, including DIKSHA and SWAYAM PRABHA, can provide insights into their potential for replication and scaling up in other parts of the country. For secondary school tribal teachers in Nagaland, awareness and implementation of digital initiatives are essential to improve student engagement and outcomes, bridge the digital divide, and enhance teaching-learning processes. Key areas of focus for this study should include digital infrastructure development, teacher training and capacity building, contextualized digital content, and monitoring and evaluation to ensure the effective integration of digital tools and resources in schools.

VI. RESEARCH METHODOLOGY

This study utilized a survey research design to investigate the awareness of ICT initiatives and digital infrastructure availability among secondary school teachers in Nagaland. The study population comprised tribal teachers at the secondary level, and due to time constraints, Kohima district was randomly selected. A sample of 200 tribal teachers was chosen using random sampling from 20 secondary schools, including government and private institutions. Prior to data collection, necessary permissions were obtained from school heads, and informed consent was collected from participating teachers. A self-developed survey questionnaire, Digital Initiatives Awareness and Digital Infrastructure (DADI), was validated through content and face validity. The questionnaire was administered to the selected teachers with proper instructions to gather data on their digital skills, awareness of digital initiatives, and ICT practices. Data analysis was performed using frequency and percentage analysis through IBM SPSS 27 version.

VII. DATA ANALYSIS AND INTERPRETATION

Table-1: Digital initiatives (Govt of India) Awareness among secondary school teachers

S. No	I(a): Digital initiatives by the Govt of India	Aware	Not aware
1	DIKSHA	180 (90%)	20 (10%)
2	e-Pathasala	189 (94.5%)	11(5.5%)
3	National Test Abhyaas (NTA)	31(15.5%)	169 (84.5%)
4	SWAYAM MOOCS	170 (85%)	30 (15%)
5	SWAYAM Prabha (32 DTH TV channels)	162 (81%)	38 (19%)
6	SWYAM PLUS	21 (10.5%)	179 (89.5%)
7	E Pub & DAISY	4 (2%)	196 (98%)
8	Shiksha Vaani (CBSE Podcasts)	3 (1.5%)	197 (98.5%)
9	IITPAL (platform for exam preparation	0 (0%)	200 (100%)
10	Radio Vahini	10 (5%)	190 (95%)
11	NATIONAL DIGITAL LIBRARY(NDL)	16 (8%)	184 (92%)
12	Free and Open-Source Software for Education (FOSSEE)	7 (3.5%)	193 (96.5%)

The data evaluates the familiarity of respondents with digital initiatives introduced by the Government of India. The study reveals varying levels of awareness among respondents about different digital initiatives.

High awareness levels: Most respondents demonstrated high awareness levels of certain digital initiatives, including DIKSHA (90%), e-Pathasala (94.5%), SWAYAM MOOCS (85%), and SWAYAM Prabha (81%). These platforms, which provide educational resources, massive open online courses, and educational TV channels, are familiar to a significant majority of respondents, indicating successful outreach and adoption among secondary school teachers in Nagaland.

Low awareness levels: A significant number of digital initiatives have low awareness levels among respondents. Specifically, most respondents are unfamiliar with National Test Abhyaas (15.5%), a platform for practice tests and assessments, as well as SWYAM PLUS (10.5%), which offers advanced educational resources. Additionally, awareness is low for Radio Vahini (5%), a platform for educational radio content, NATIONAL DIGITAL LIBRARY (8%), a digital repository of educational resources, and Free and Open-Source Software for Education (FOSSEE) (3.5%). These findings suggest that these initiatives have not yet reached a wide audience among secondary school teachers in Nagaland.

Extremely low awareness levels: Almost all respondents are unfamiliar with certain digital initiatives, including E Pub & DAISY (2%), a platform for accessible educational resources, and Shiksha Vaani (1.5%), a platform for educational podcasts. Notably, none of the respondents are familiar with IITPAL (0%), a digital platform for exam preparation. These findings indicate a significant lack of awareness about these initiatives among secondary school teachers in Nagaland, suggesting a need for greater promotion and dissemination of information about these resources.

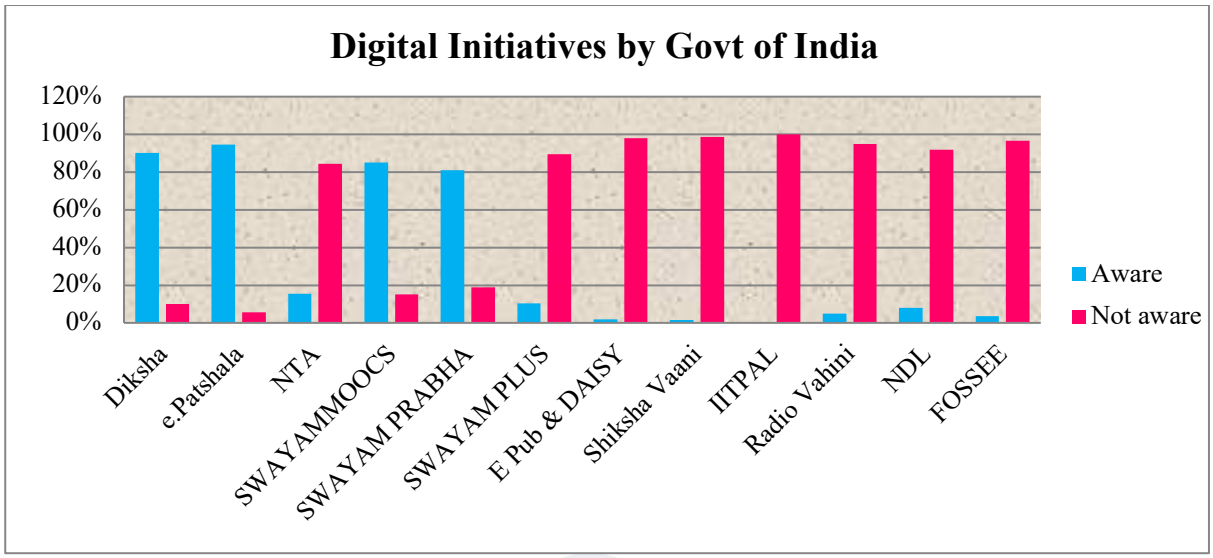


Figure No. 1. Teachers' Awareness of Digital Initiatives by the Government of India

The data evaluates the familiarity of respondents with digital initiatives introduced by the Government of Nagaland State. The results show the frequency and percentage of secondary school who are aware or not aware of each initiative.

Table-2: Digital initiatives (Govt of Nagaland) Awareness among secondary school teachers

S.No	I(b): Digital initiatives by the Govt of Nagaland	Aware	Not aware
1	Nagaland is the first Indian State to introduce the Online Evaluation Portal for Upper Primary and Secondary School Children.	193 (96.5%)	7 (3.5%)
2	Teachers Online Transfer Portal.	194 (97%)	6 (3%)
3	Nagaland is the 14th State in India to launch the Tele/Online Education Program during the COVID-19 Lockdown.	195 (97.5%)	5 (2.5%)
4	Nagaland is the First State in India to include Sign Language Interpretation in the video lessons for school children.	111 (55.5%)	89 (44.5%)
5	'Online Students Evaluation Portal 'https://dosenl.in'.	196 (98%)	4 (2%)
6	'Bright Tutee' App which supports learning of the subjects Mathematics and Science.	171 (85.5%)	29(14.5%)
7	India 4.0 - Dr APJ" Project in Nagaland.	147 (73.5%)	53(26.5%)
8	TV at Village Hall, School Auditorium, etc	171 (85.5%)	29 (14.5%)
9	YouTube channel of the department, 'DoSE Nagaland'.	193 (98.5%)	7 (3.5%)
10	IEC materials on safe online learning http://education.nagaland.gov.in/.	56 (28%)	144 (72%)
11	The 'Continuous Learning & Monitoring Cell' oversees the implementation of the project under the Chairmanship of the Principal Director, School Education.	85 (42.5%)	115 (57.5%)

12	Radio for daily broadcast of the recorded lessons for 3 hours per day.	77 (38.5%)	123 (61.5%)
13	In Nagaland, learning materials were distributed on pen drives at a nominal charge to interested parents.	42 (21%)	158 (79%)
14	The Teacher's APP (GPS Tracking of the Teacher's Diary) by the DoSE	197 (98.5%)	3 (1.5%)
15	the Facebook page 'School Education, Nagaland'.	193 (96.5%)	7 (3.5%)

The initiatives implemented by the Government of Nagaland have shown varying levels of success.

1. Online Evaluation Portal: The Online Evaluation Portal was the first of its kind in India, introduced for upper primary and secondary school children. With an awareness level of 96.5%, it has been highly successful, with widespread recognition.

2. Online Transfer Portal: The Online Transfer Portal has achieved near-universal recognition, with an awareness level of 97%. This portal has been highly successful in facilitating teachers transfers.

3. Tele/Online Education Programme: Launched during the COVID-19 lockdown, the Tele/Online Education Programme has been extremely successful, with an awareness level of 97.5%. It has provided online education to students, ensuring continuity of learning.

4. Sign Language Interpretation: The Sign Language Interpretation initiative includes sign language interpretation in video lessons for school children. However, with an awareness level of 55.5%, it requires increased promotion to reach more people.

5. Online Students Evaluation Portal: The Online Students Evaluation Portal has been extremely successful, with an awareness level of 98%. This portal has streamlined the evaluation process, making it more efficient.

6. Bright Tutee App: The Bright Tutee App supports learning of mathematics and science. With an awareness level of 85.5%, it has been successful in promoting digital learning.

7. India 4.0 - Dr APJ Project: The India 4.0 - Dr APJ Project aims to promote digital education. However, with an awareness level of 73.5%, it requires increased promotion to reach its full potential.

8. TV at Village Hall/School Auditorium: The TV at Village Hall/School Auditorium initiative provides educational content through TV. With an awareness level of 85.5%, it has been successful in promoting education in rural areas.

9. YouTube Channel (DoSE Nagaland): The official YouTube channel of the Department of School Education, Nagaland has been extremely successful, with an awareness level of 98.5%. It provides a platform for sharing educational content.

10. IEC Materials on Safe Online Learning: The IEC Materials on Safe Online Learning initiative provides information on safe online learning practices. However, with an awareness level of 28%, it requires significant promotion to reach more people.

11. Continuous Learning & Monitoring Cell: The Continuous Learning & Monitoring Cell oversees the implementation of digital education projects. With an awareness level of 42.5%, it requires increased promotion to reach its full potential.

12. Radio for Daily Broadcast of Recorded Lessons: The Radio for Daily Broadcast of Recorded Lessons initiative provides educational content through daily radio broadcasts. However, with an awareness level of 38.5%, it requires increased promotion to reach more people.

13.Learning Materials on Pen Drives: The Learning Materials on Pen Drives initiative distributes learning materials on pen drives at a nominal charge. However, with an awareness level of 21%, it requires significant promotion to reach more people.
14.Teacher's APP (GPS Tracking of Teacher's Diary): The Teacher's APP (GPS Tracking of Teacher's Diary) has been extremely successful, with an awareness level of 98.5%. It provides a platform for tracking teacher attendance and activities.

15.Facebook Page (School Education, Nagaland): The official Facebook page of the School Education Department, Nagaland has been highly successful, with an awareness level of 96.5%. It provides a platform for sharing educational content and updates.

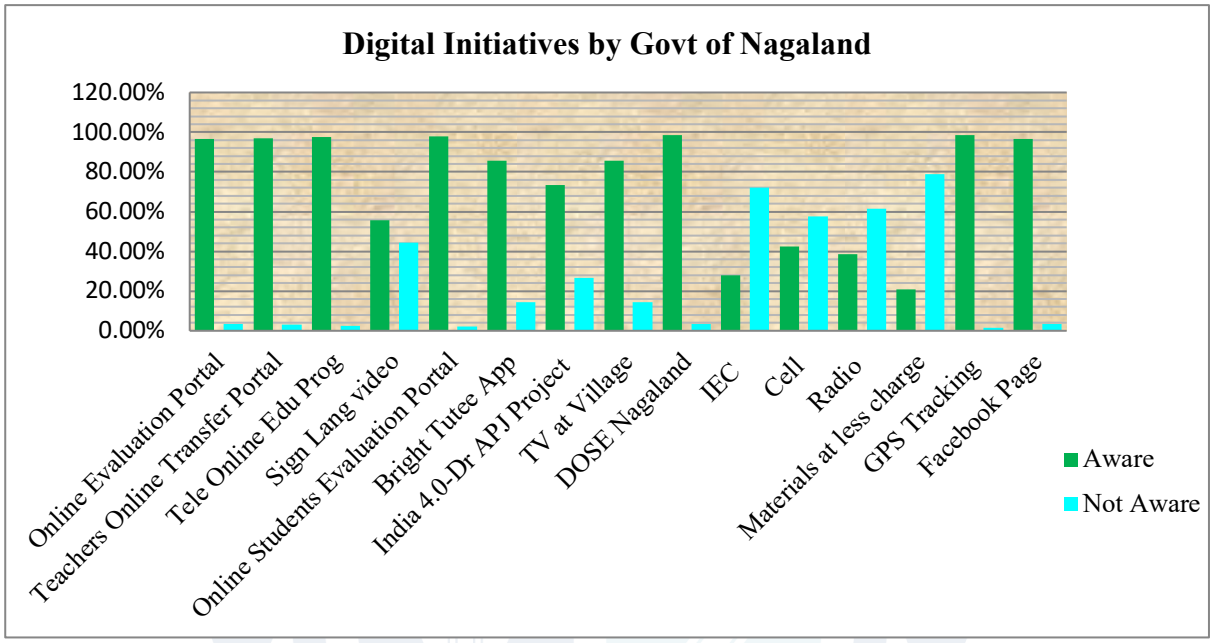


Fig. No. 2. Teachers' awareness of Digital Initiatives by the Government of Nagaland

Table-3: Availability of Digital Infrastructure in Secondary Schools

Sl. No	Various Digital Infrastructure	Available	Not Available
1	Scanners	40 (20%)	160(80%)
2	Television set with DTH/cable connection	7 (3.5%)	193 (96.5%)
3	Networks like Internet & software apps	2 (1%)	198 (99%)
4	LCD projectors	8 (4%)	192 (96%)
5	Antivirus Software	9 (4.5%)	191 (95.5%)
6	Printers	15 (7.5%)	185 (92.5%)
7	Smartphone with internet	196 (98%)	4 (2%)
8	Overhead Projectors	4 (2%)	196 (98%)
9	Laptop	18 (9%)	182 (91%)
10	Smart boards in classrooms	20 (10%)	180 (90%)
11	Computers	29 (14.5%)	171 (85.5%)
12	Electricity	198 (99%)	2 (1%)
13	Backup generator	13 (6.5%)	187 (93.5%)

The data reveals the availability of various ICT tools and technologies in schools.

Widely Available Facilities: Firstly, smartphones with internet connectivity are available in 98% of schools, indicating that most schools have smartphones with internet access. Secondly, electricity is available in 99% of schools, suggesting that almost all schools have a stable electricity supply. These findings highlight the widespread adoption of smartphones and reliable electricity in schools, providing a foundation for leveraging technology to enhance teaching and learning.

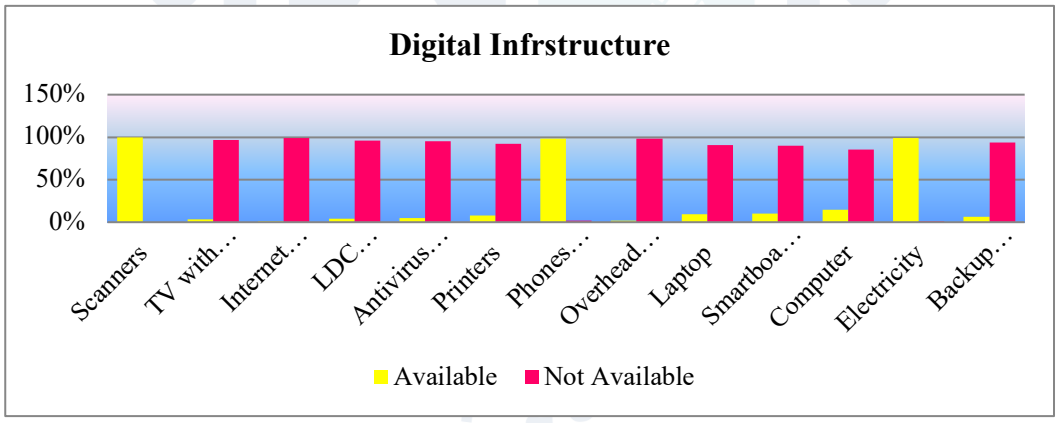
Limited Availability Facilities: For instance, only 3.5% of schools have television sets with DTH/cable connections, while a mere 1% have networks like internet and software apps, highlighting a major deficiency. Additionally, LCD projectors are available in just 4% of schools, and antivirus software in 4.5%, posing significant security risks. Printers are also scarce, with only 7.5% of schools having this facility. These numbers underscore the need for increased investment in digital infrastructure and educational technology to bridge these gaps and ensure effective teaching and learning.

Moderately Available Facilities: Scanners are available in 20% of schools, indicating that a significant number of schools lack this facility. Laptops are available in 9% of schools, while smart boards in classrooms are available in 10% of schools, showing a moderate level of adoption. Computers are available in 14.5% of schools, indicating a moderate level of availability.

Facilities with Low Availability: The study highlights significant gaps in educational infrastructure, particularly with regards to overhead projectors and backup generators. Overhead projectors are available in only 2% of schools, indicating a substantial deficiency in teaching aids. Similarly, backup generators are available in just 6.5% of schools, underscoring the need for increased investment in infrastructure to ensure uninterrupted power supply and support effective teaching and learning.

The data highlights the need for increased investment in digital infrastructure, particularly in areas such as internet connectivity, software applications, and hardware facilities. These findings suggest that while some ICT tools and technologies are widely available in schools, others are limited or have low availability, indicating a need for increased investment in digital infrastructure and educational technology.

Fig. No. 3. Digital Infrastructure in Secondary Schools



VIII. FINDINGS AND DISCUSSION

This study assesses the familiarity of secondary school teachers in Nagaland with digital initiatives introduced by the Government of India. The findings reveal a varying level of awareness among respondents, with some initiatives having high awareness levels, such as DIKSHA (90%), e-Pathasala (94.5%), SWAYAM MOOCS (85%), and SWAYAM Prabha (81%) (Babu & Suneela, 2023). In contrast, other initiatives, like National Test Abhyaas (15.5%), SWAYAM PLUS (10.5%), and Radio Vahini (5%), have low awareness levels, indicating a need for increased promotion (Pritam & Shaikh, 2024). The disparity in awareness levels can be attributed to factors like inadequate promotion, limited accessibility, and lack of relevance to specific needs (Sukhalu, 2021). Despite efforts by the Department of School Education in Nagaland to enhance digital infrastructure and governance, more needs to be done to bridge the digital divide and cater to student requirements (Sukhalu, 2021). The success of online digital education initiatives, such as the Tele/Online Education Programme, demonstrates the potential of digital education to enhance learning outcomes (Nexus of Good). The study also reveals a mixed picture of ICT tool availability in schools, with smartphones and electricity being widely available, but other tools like television sets with DTH/cable connections and LCD

projectors having limited availability (MoE, GoI, UDISE+, 2023-24). These findings are consistent with existing research highlighting digital infrastructure challenges in Indian schools (Pritam & Shaikh, 2024; Supardi et al., 2024).

The findings have implications for policymakers and educators, emphasizing the need for increased investment in digital infrastructure and educational technology to bridge the gaps and ensure that all schools have access to necessary tools and resources (Bariu, 2020). Targeted initiatives and effective promotion of digital initiatives can also help bridge the digital divide and enhance learning outcomes.

IX. CONCLUSION

The study highlights the need for increased investment in digital infrastructure and educational technology to bridge the gaps and ensure that all schools have access to necessary tools and resources. The findings also suggest that promoting digital initiatives effectively is essential to achieve their intended goals. The results are consistent with existing research that highlights the digital infrastructure challenges in Indian schools and the need for improved digital infrastructure and targeted initiatives. Bridge the gap between government and private schools in terms of digital infrastructure and resources.

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