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Digital Learning Adoption Struggles In Under-Resourced Tribal Schools: A Narrative Study Of Educational Heads Of Nagaland

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Abstract:
Background: *Digital learning has become the center of educational reform nowadays; nevertheless, its deployment in poorly equipped tribal schools continues to be characterized by the perpetuation of structural inequities and contextual limitations. There is still a lack of empirical research to shed light on how school leaders in marginalized areas make sense of and manage the digital integration practice in the context of limited resources.*
Materials and Methods: *This qualitative narrative study was conducted to understand the lives and experiences of six educational heads of government schools from three different districts of Nagaland - Kohima, Mokokchung, and Dimapur. The participants were chosen through purposive sampling based on their leadership roles in digital initiatives. The data were obtained through in-depth semi-structured interviews and thoroughly analyzed using an inductive thematic framework to explore the institutional, technological, and socio-cultural aspects that influenced the digital adoption.*
Results: *The findings reveal that the digital inequalities have several layers, as the cases of infrastructural deficits, unstable connectivity, limited teacher digital competence, low parental digital literacy, and constrained leadership preparedness are the main areas that were observed. The participants acted as adaptive leaders by doing localized improvisation and community engagement.*
Conclusion: *The study, analyzed through the lens of digital divide theory (van Dijk, 2020) and aligned with India's National Education Policy 2020, highlights a structural gap between the digital reform agenda and the current reality in tribal schools and stresses the importance of implementing a policy that is both systemic and leadership-focused.*
Keywords: *Digital Learning, Digital Divide, Educational Leadership, Tribal Education, Digital Equity, NEP 2020*

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I. Introduction

The rise of digital learning amid the pandemic of COVID-19 has affected educational systems globally, though the benefits remain unevenly distributed among various socio-economic and geographical settings (UNESCO, 2023). The National Education Policy of India, 2020 (NEP 2020) considers digital education as a potential major lever of equity and innovation, Therefore, it prioritizes the expansion of infrastructure, the introduction of blended learning models, and continual professional development for teachers as key elements of education reform.(Ministry of Education, 2020). However, empirical evidence shows that policy ambitions alone are insufficient; the conversion of digital mandates into real learning outcomes depends on the local infrastructure, institutional readiness, and human capacity. (Mishra, Gupta, & Shree, 2020).

These implementation challenges are particularly acute in tribal-majority and geographically remote regions. Nagaland, where over 85% of the population belongs to Scheduled Tribes (Government of India, 2011), presents a distinctive socio-educational context shaped by mountainous terrain, dispersed settlements, infrastructural limitations, and constrained institutional resources. The Northeastern region continues to experience persistent connectivity disparities, including lower broadband penetration and unstable network services in rural districts (Chakravarty & Tyagi, 2025). Empirical studies from the region further document restricted device access, unstable internet connectivity, and limited institutional preparedness as recurring impediments to sustained digital instruction (Lavanya & Tiwari, 2025)

Institutional and human capacity factors significantly mediate digital adoption. Research conducted in Nagaland reveals marked variation in teachers' digital competence, with private-managed schools generally demonstrating higher readiness than government institutions (Jamir & Babu, 2023). Similarly, studies on pre-service teachers in the state report modest levels of digital and data literacy, underscoring the need for structured professional development to translate technological access into pedagogical effectiveness (Babu, 2024). Complementary findings from rural Indian contexts indicate that digital literacy, affordability of devices, and teacher preparedness are among the strongest predictors of successful digital learning outcomes (Venugopal et al., 2025). Together, these findings suggest that infrastructure alone does not guarantee meaningful integration. Conceptually, these multilayered constraints align with van Dijk's (2020) multi-level digital divide, which distinguishes inequalities in physical access (first-level divide), digital skills (second-level divide), and the capacity to achieve meaningful outcomes through technology use (third-level divide). In tribal school settings, structural deficits intersect with socio-cultural factors such as linguistic diversity and limited parental digital literacy, further shaping digital adoption trajectories.

Despite growing scholarship on educational technology, existing studies largely prioritize infrastructure and teacher competence, offering limited insight into how school leaders interpret and negotiate digital reforms within marginalized institutional environments. (Patra et al., 2025). Addressing this gap, the present study employs narrative inquiry to examine how educational heads of under-resourced tribal schools in Nagaland interpret, negotiate, and implement digital learning initiatives. By situating administrators' lived experiences within Digital Divide Theory (van Dijk, 2020) and the equity-oriented vision of NEP 2020, the study advances a leadership-centered understanding of digital adoption in marginalized contexts. Rather than conceptualizing digital transformation as a technological intervention alone, the study foregrounds the institutional, socio-cultural, and leadership dynamics that condition its sustainability. In doing so, it contributes empirically grounded insights to ongoing debates on equitable digital reform in resource-constrained educational settings.

II. Literature Review

The global expansion of digital learning, dramatically accelerated by the COVID-19 pandemic, has produced a robust but uneven body of scholarship examining access, competence, and outcomes associated with technology-mediated education. Early pandemic-era research highlighted the promise of remote learning for continuity of instruction but also emphasized that hurried implementation risked amplifying existing inequalities (Gopika & Rekha, 2023; World Bank, 2021). At the national level, large-scale Indian surveys and program evaluations documented significant learning loss and uneven access patterns that contextualize these global trends (ASER Centre, 2021, 2022).

Conceptualizing the digital divide: multi-level frameworks

Contemporary reviews conceptualize the digital divide as multi-layered: first-level (access), second-level (skills and usage), and third-level (outcomes and benefits). This framing explains why distribution of devices alone does not ensure equitable learning outcomes; instead, disparities in competencies, pedagogical integration, and household supports shape the realized benefits of technology (Ferreira et al., 2021).In the Indian context, this multi-tiered view helps interpret evidence showing that differential access, teacher preparedness, and socio-economic resources jointly determine whether digital interventions reduce or widen educational inequities (Paliwal & Singh, 2021; Jafar et al., 2023).

Infrastructure and reach: empirical evidence from India

Empirical data from India reveal persistent infrastructural constraints that align with the first-level digital divide. National and state surveys show that many households — particularly in rural, tribal, and low-income communities — lacked reliable internet, suitable devices, or stable electricity during school closures, limiting participation in synchronous remote learning (ASER Centre, 2021). Studies from specific states corroborate this pattern: for example, large surveys in Tamil Nadu and field studies in West Bengal documented substantial heterogeneity in connectivity and device access that shaped students' ability to engage with online classes (Jafar et al., 2023; Kapasia et al., 2020). These access constraints help explain why several Indian districts required multi-modal approaches (broadcast, printed materials, and low-bandwidth resources) to extend learning continuity.

Teacher competencies, professional learning, and emotional labour

Teacher capacity emerged as a central mediating factor in whether technology translated into pedagogical gains. Several empirical studies in India reported that many emergency training programmes were short, remote, and generic, limiting teachers' ability to adopt student-centred, technology-mediated pedagogies (Sinha,2025). Where sustained, school-based, hands-on professional development occurred, teachers reported

higher confidence and better classroom transfer; conversely, lack of follow-up and contextual coaching led to skill attrition (Osorio et al., 2025). Qualitative and content-analysis studies have also documented increased workload and emotional strain among teachers — the 'digital labour' of converting content, managing remote engagement, and supporting students remotely — which affects teacher well-being and the sustainability of digital practices (Devi Priya, 2022)

Student engagement and heterogeneous outcomes

Research consistently shows that student experiences of digital learning are heterogeneous. While some students benefited from visual and interactive digital resources, many others experienced distraction, limited engagement, and diminished learning outcomes — especially when devices were shared or connectivity was intermittent (Khan et al., 2021; ASER Centre, 2022). National assessment data indicate that learning losses in foundational reading and arithmetic were widespread and are only partially explained by temporary school closures; unequal access to quality remote instruction is a major driver (ASER Centre, 2022).These findings illustrate the third-level digital divide: access does not automatically translate into measurable learning gains.

Policy context: NEP 2020 and implementation gaps

At policy level, India's National Education Policy (NEP) 2020 promotes the use of technologies in teaching, investments in the digital infrastructure, upgrading teacher competencies as well as multi-mode resource dissemination (Government of India, 2020). Empirical reports and field studies, however, show that there is a gap between NEP's ambitious goals and the specific realities of different regions due to lack of resources, absence of localized planning, and ineffective teacher support systems— in fact, these constraints hinder effective implementation in many under-resourced districts (Malla et al., 2024; ASER Centre, 2021). To bridge this gap between policy and practice, there is a need to understand the contextual realities at the school level.

Gaps in the current literature

While quantitative national surveys and program evaluations are on the rise, reviewers have continuously pointed out that there is a lack of deeply narrative and qualitative research studies that focus on the actual experiences of teachers and school leaders during the large-scale digital transitions (Lythreatis et al., 2022).Narrative and ethnographic accounts can be extremely helpful in showing emotional labour, local improvisations, administrative decision-making, and community dynamics that are hidden by quantitative metrics. In the present study, we have focused on school-level narratives from under-resourced regions that highlight policy enactment, resistance, and local innovation. This helps to develop the qualitative strand that is currently under explored.

III. Methodology

This study adopted a qualitative narrative research design to explore the lived experiences of educational administrators regarding digital integration in under-resourced tribal schools. The narrative approach was considered appropriate as it enables in-depth understanding of participants' perspectives within their socio-cultural and institutional contexts.

Participants and Sampling

The participants for this study were selected from six educational heads from Government schools from Mokokchung, Kohima and Dimapur district of Nagaland. A purposive sampling technique was used for the selection keeping in mind the differences in geographical locations, infrastructural access, and institutional capacities.

Participant Demographics Table

Table 1

Participant Demographics

Role/Designation	Years of Experience	District	School Level
Principal	17+ years	Kohima	Higher Secondary
Principal	25 years	Kohima	Secondary
Assistant Headmistress	25+ years	Mokokchung	High School
Assistant Headmaster	20 years	Mokokchung	High School
Assistant Headmistress	30 years	Dimapur	High School
Principal	16 years	Dimapur	Higher Secondary

Data Collection

Data were collected through semi-structured interviews, allowing flexibility to probe participants' experiences while maintaining alignment with the research objectives. The interview schedule focused on infrastructure availability, teacher preparedness, student engagement, connectivity challenges, community involvement, and administrative strategies for digital integration. Interviews were conducted with informed consent, and participants were assured of confidentiality and anonymity.

Data Analysis

The qualitative data were analyzed using thematic analysis. All interviews were transcribed verbatim to maintain accuracy. The researcher engaged in repeated reading of the transcripts to ensure familiarity with the data. An inductive coding process was employed, wherein meaningful units of information were identified and labeled without imposing predetermined categories. Through constant comparison, similar codes were grouped into broader categories, which were subsequently refined into major themes representing structural, pedagogical, technological, and socio-cultural dimensions of digital integration.

The themes were reviewed against the original transcripts to ensure consistency between participants' narratives and the researcher's interpretations. Representative verbatim excerpts were incorporated in the findings to enhance transparency and preserve participants' authentic voices.

Ethical Considerations

Ethical standards were maintained throughout the research process. Participants provided informed consent prior to data collection, and their identities were anonymized to protect confidentiality. The study adhered to principles of voluntary participation, privacy, and responsible reporting of findings.

Research Questions

1. How do educational heads construct meaning around digital learning adoption within structurally constrained tribal school contexts?
2. How do they negotiate institutional and contextual constraints while implementing digital initiatives?

IV. Findings And Discussion

Table 2

Thematic Analysis of Administrators' Narratives on Digital Integration in Tribal Schools

Major Theme	Key Sub-Themes	Illustrative Evidence
Inadequate Digital Infrastructure	Limited hardware; outdated devices; funding gaps	"We have only two or three computers…"
Teacher Capacity Gaps	Online-only training; lack of ICT skills	"Training has not been effective…"
Student Digital Engagement	Engagement through visuals; misuse of phones	"Students find it very engaging…"
Connectivity Constraints	Unstable internet; power disruptions	"Internet facilities are frequently disrupted…"
Community and Parental Factors	Limited digital literacy; community support	"Many parents are illiterate…"
Leadership Capacity Gaps	Need for administrative training	"Starting from me… we need training…"
Strategic Recommendations	Infrastructure-first; school-based workshops	"Start from the grassroots…"

Findings and Discussion

Thematic analysis pointed out seven closely linked aspects that jointly determine how digital integration happens in under-resourced tribal schools. These topics are in line with the structural, pedagogical, technological as well as socio-cultural facets, which together set the rhythm and the level at which digital transformation can be sustained.

1. Inadequate Digital Infrastructure as a Foundational Barrier

The findings suggest that poor infrastructure was the biggest barrier to the digital integration. Teachers mentioned the limited hardware, old and broken devices, no digital classrooms, and a lack of money. One Principal said, "We only have two or three computers… not enough for a proper computer lab." Another administrator emphasized that "Most of the computers are outdated and need to be upgraded." Such narratives suggest that digital initiatives remain symbolic rather than being deeply ingrained in the system. This is, in fact, consistent with national and global studies that identify infrastructure as the foundational layer of digital equity (UNESCO, 2023). No matter how great the efforts or the environmental features, the adoption of technology will fail without reliable devices, digital classrooms, and uninterrupted financial support. These findings also

shed light on the "first-level digital divide," which is marked by inequalities in the distribution of physical assets (van Dijk, 2020). Besides lack of infrastructure, tribal areas are also isolated geographically, which further worsens the existing systemic inequities.

2. Teacher Capacity Gaps and Training Limitations

Other than the physical facilities, teacher readiness was the major issue during the pandemic. Principals said that the training which was done only online was not actually very effective as it involved very little hands-on element. One of them even remarked, "Since the training was online, it has not really been very effective because of the lack of hands-on (practice)." Some even underlined the fact that there were still quite tremendous gaps in the advanced ICT and Artificial Intelligence skill competencies. The results are in line with the scholarly articles claiming professional development should be continuous, linked to the local situation, and focused on the actual practice so as to bring about real pedagogical change (Darling-Hammond et al., 2017). The exclusive use of short-term or completely online training might result in technological familiarity at a very superficial level rather than pedagogical integration. This represents the "second-level digital divide" which refers to the differences in skills and digital competence (van Dijk, 2020).

3. Contradictory Patterns of Student Digital Engagement

Student engagement with digital learning was a mixture of excitement and misuse. School leaders noticed more student participation when audiovisual resources were used: "Students are very engaged when we use the smart TV." More importantly, the administrators were worried about the students being distracted and overusing their phones mainly for entertainment.

This tension mirrors wider studies on young people's use of digital media, where technology can be a tool for learning and getting involved but also a source of distraction if not properly directed (OECD, 2021). The results imply that teaching digital literacy should be about responsible use and critical thinking, along with exposure to devices.

4. Connectivity and Geographical Constraints

Students hailing from remote and mountainous regions complained about the absence of constant internet connection and the occurrence of power cuts. This type of infrastructural weakness inhibits the regularity of digital teaching and adds to the existing disparities between different regions. Studies revealed lack of connectivity as one of the most significant challenges to give equitable digital education in rural and deprived areas of developing countries (UNESCO, 2023). In the context of tribal, inequalities are intensified by the geographical isolation, making unreliable on online dependency.

Geographical isolation in tribal contexts, for instance, will make the disparities even more severe, thereby rendering online-dependent strategies as unreliable. To sum up, Themes 1 to 4 reveal how educational leaders perceive the introduction of digital learning as being structurally influenced by the lack of infrastructure, limited skills, uncertainties in student-use, and geographical instability. These interconnected realities show the interpretive lenses through which administrators understand digital transformation in tribal areas with very limited resources. In this way, we are not only uncovering the systemic level of Research Question 1 but also the individual level of isolated challenges.

This set of interrelated facts along the way interpretive frameworks unveil through which the school leaders' administrators understand the process of digital reform in under-resourced tribal schools. Hence, this is a systemic level answer to Research Question 1 instead of isolated challenges only.

5. Community Support and Parental Barriers

The narrative revealed a strong sense of community support, but also indicated that parents have little knowledge of digital technologies. Although the communities helped with infrastructural support and sharing of devices, a large number of the parents were not in a position to academically guide their children due to illiteracy or lack of familiarity with technology. This points to the socio-economic aspects of the digital divide where having access is not always the same as having the capacity to use it effectively for educational purposes (van Dijk, 2020). Hence, community-based digital sensitization programs may play an important role in tribal areas.

6. Leadership Capacity Gaps in Digital Governance

It is noteworthy of the administrators that they admit of their lack of digital knowledge and their need of digital training. As one principal stated, "Starting from me, we are aware but apprehensive… we need training in PowerPoint and advanced tools." This kind of recognition by oneself brings attention to leadership as being a key and at the same time an unexplored aspect of digital transformation. Realizing a digitally

advanced school environment depends on leadership that is both visionary and technologically savvy (Fullan, 2016). Reforms in digitalization without empowered leadership may remain merely policy-level aspirations.

7. Pathways for Sustainable Digital Integration

Participants suggested strategies for the future, such as planning infrastructure, appointing trained computer teachers, including digital literacy in the curriculum, organizing workshops at schools, and placing more emphasis on offline content during transitional phases. Their recommendations show that they are advocates of a practical, context-oriented reform strategy.The emphasis on building a strong foundation is in line with systemic reform models, which argue that digital transformation should be comprehensive, integrating infrastructure, community engagement, leadership as well as pedagogy. (Fullan, 2016; UNESCO, 2023). Hence, the findings point out that for tribal schools to integrate digital technologies sustainably, it requires structural investment and teacher's skills development.

Contrary to the structural constraints discussed previously, the strategic recommendations that the participants came up with demonstrate adaptive and context-sensitive negotiation. By prioritizing infrastructure strengthening, localized training, curriculum integration, and community engagement, educational heads reveal how digital initiatives are pragmatically implemented despite institutional limitations, thereby responding directly to Research Question 2.

Overall, the findings show that the implementation of digital integration in tribal schools goes much further than the simple adoption of technology. It actually reflects the complex layering of the structural constraints and contextual negotiation. Infrastructure deficits, skill shortage, unstable connectivity, and socio-economic factors create a complex web that affects school leaders' experiences of educational reform. Yet, the demonstrated willingness of heads to adapt—supported by community solidarity and student engagement—suggests emergent capacity for transformation. Sustainable digital equity in tribal contexts therefore requires coordinated structural investment alongside localized capacity-building and culturally responsive implementation frameworks.

V. Conclusion

This research work explores the experience of educational heads of tribal schools with extreme scarcity of resources in the adoption of digital learning. Moreover, it was also revealed how they find ways to cope with institutional and contextual limitations. The results show that integration of digital technologies in tribal areas is influenced by various structural factors like poor infrastructure, shortage of trained teachers, unstable connectivity, and socio-economic challenges. Inevitably, these factors limit the scope for digital initiatives to be slow, partial, and limited rather than transformative.

However, the study also reveals the administrator's adaptive agency as they use context-sensitive strategies like giving priority to infrastructure development, encouraging localized training, and mobilizing community support to a great extent. Their actions basically represent negotiated implementation in structurally constrained environments.

The study concludes that sustainable digital transformation in tribal schools requires coordinated policy support, sustained infrastructural investment, continuous professional development, and implementation of culturally appropriate frameworks. Bridging the digital divide in such contexts requires alignment between national digital goals and the lived realities of marginalized educational settings.

References

[1]. ASER Centre. (2021). Annual Status Of Education Report (Rural) 2021 (ASER 2021). Pratham/ASER. Https://Img.Asercentre.Org/Docs/Aser2021finalreport_16.116.54pm1.Pdf

[2]. ASER Centre. (2022). Annual Status Of Education Report 2022 (ASER 2022). Pratham/ASER. Https://Asercentre.Org/Aser-2022/

[3]. Babu, M. R. N. (2024). Digital Literacy Among Pre-Service Teachers In Nagaland: Implications For Teacher Education. International Journal Of Education And Society, 12(1), 45–58.

[4]. Chakravarty, D., & Tyagi, T. (2025, August 26). Internet Connectivity In Northeast India: Gaps, Gains And Future Growth. Observer Research Foundation. Https://Www.Orfonline.Org/Expert-Speak/Internet-Connectivity-In-Northeast-India-Gaps-Gains-And-Future-Growth

[5]. Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). Effective Teacher Professional Development. Learning Policy Institute. Https://Files.Eric.Ed.Gov/Fulltext/ED606743.Pdf

[6]. Devi Priya, S. (2022). Digital Labor Of School Teachers And Their Well-Being: Content Analysis Of English-Language Dailies In India. Decision, 49, 203–212. Https://Doi.Org/10.1007/S40622-022-00318-9

[7]. Fullan, M. (2016). The New Meaning Of Educational Change (5th Ed.). Teachers College Press. Https://Books.Google.Co.In/Books?Id=Olhdcwaaqbaj&Printsec=Frontcover#V=Onepage&Q&F=False

[8]. Gopika, J. S., & Rekha, R. V. (2023). Awareness And Use Of Digital Learning Before And During COVID-19. International Journal Of Educational Reform. Advance Online Publication. Https://Doi.Org/10.1177/10567879231173389

[9]. Government Of India. (2011). Census Of India 2011: Primary Census Abstract. Office Of The Registrar General & Census Commissioner.

[10]. Jamir, Y., & Babu, M. R. N. (2023). Digital Competence Among School Teachers In Nagaland State: Differences With Reference To Type Of Management, Work Experience, And Subject Taught. Indian Journal Of Educational Technology, 5(2), 133–142.

[11]. Jafar, K., Ananthpur, K., & Venkatachalam, L. (2023). Digital Divide And Access To Online Education: New Evidence From Tamil Nadu, India. Journal Of Social And Economic Development, 25, 313–333. Https://Doi.Org/10.1007/S40847-023-00236-1
[12]. Khan, M. A., Kamal, T., Illiyan, A., & Asif, M. (2021). School Students' Perception And Challenges Towards Online Classes During COVID-19 Pandemic In India: An Econometric Analysis. Sustainability, 13(9), 4786. Https://Doi.Org/10.3390/Su13094786
[13]. Kapasia, N., Paul, P., Roy, A., Saha, J., Zaveri, A., Mallick, R., Barman, B., Das, P., & Chouhan, P. (2020). Impact Of Lockdown On Learning Status Of Undergraduate And Postgraduate Students During COVID-19 Pandemic In West Bengal, India. Children And Youth Services Review, 116, Article 105194. Https://Doi.Org/10.1016/J.Childyouth.2020.105194
[14]. Laishram, P. (2023). Effectiveness Of E-Learning During The Pandemic: Perceptions Of Selected Parents In Manipur. Educational Quest: An International Journal Of Education And Applied Social Sciences/Educational Quest. Https://Doi.Org/10.30954/2230-7311.3.2023.6
[15]. Lavanya, S., & Tiwari, G. N. (2025). Enhancing Digital-Age Professional Development For Teacher Educators In Nagaland: Integrating Technological Pedagogical Content Knowledge (TPACK), Digital Literacy, And Computational Thinking In B.Ed. Programmes. Ad Eduxian Journal, 2(1), 52–70. Https://Educarepublication.Com/Wp-Content/Uploads/2025/05/R-7-Lavanya.-S.-Dr.G.N.-Tiwari.Pdf
[16]. Lythreatis, S., Singh, S. K., & El-Kassar, A.-N. (2022). The Digital Divide: A Review And Future Research Agenda. Technological Forecasting And Social Change, 175, 121359. Https://Doi.Org/10.1016/J.Techfore.2021.121359
[17]. Ministry Of Education. (2020). National Education Policy 2020. Government Of India. Https://Www.Education.Gov.In/Sites/Upload_Files/Mhrd/Files/NEP_Final_English.Pdf
[18]. Mishra, L., Gupta, T., & Shree, A. (2020). Online Teaching-Learning In Higher Education During Lockdown Period Of COVID-19 Pandemic. International Journal Of Educational Research Open, 1, 100012. Https://Doi.Org/10.1016/J.Ijedro.2020.100012
[19]. Osorio Vanegas, H. D., Segovia Cifuentes, Y. D. M., & Sobrino Morrás, A. (2025). Educational Technology In Teacher Training: A Systematic Review Of Competencies, Skills, Models, And Methods. Education Sciences, 15(8), 1036. Https://Doi.Org/10.3390/Educsci15081036
[20]. OECD (2021), 21st-Century Readers: Developing Literacy Skills In A Digital World, PISA, OECD Publishing. Https://Doi.Org/10.1787/A83d84cb-En.
[21]. Patra, D., Dutta, M. & Bharti, N. Educational Infrastructure Challenges In Tribal Regions In India: An Enquiry In The Context Of NEP 2020. J. Soc. Econ. Dev. (2025). Https://Doi.Org/10.1007/S40847-025-00446-9
[22]. Paliwal, M., & Singh, A. (2021). Teacher Readiness For Online Teaching-Learning During COVID-19 Outbreak: A Study Of Indian Institutions Of Higher Education. Interactive Technology And Smart Education, 18(3), 403–421. Https://Eric.Ed.Gov/?Id=EJ1311467
[23]. Sinha, S. (2025). Teacher Professional Development In Technology-Enhanced Learning Environments: Successful Models For Indian Educators To Succeed In Digital Classrooms. Indian Journal Of Educational Technology, 7(II), 257–279. Retrieved From Https://Journals.Ncert.Gov.In/IJET/Article/View/1423
[24]. UNESCO. (2023). Global Education Monitoring Report 2023. UNESCO Publishing. Https://Unesdoc.Unesco.Org/Ark:/48223/Pf0000385723
[25]. UNESCO. (2023). Global Education Monitoring Report 2023: Technology In Education—A Tool On Whose Terms? UNESCO Publishing. Https://Doi.Org/10.54676/UZQV8501
[26]. Van Dijk, J. (2020). The Digital Divide. Polity Press. Https://Www.Researchgate.Net/Publication/336775102_The_Digital_Divide
[27]. Venugopal, S., Kumar, R., & Singh, P. (2025). Impact Of Digital Learning Platforms On Rural Education: Predictive Analytics And Regression Analysis. Journal Of Educational Technology Research, 18(1), 1–19.
[28]. Ziipao, R. R. (2023). Out Of Coverage Area: Tribes And Digital Exclusion In North-East India. Journal Of Development Policy And Practice. Https://Doi.Org/10.1177/24551333231163930