© AUG 2025 | IRE Journals | Volume 9 Issue 2 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I2-17122935

Digital Learning Readiness and Educational Equity across Urban and Rural Schools of Giridih District: A Secondary-Data Analysis

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Abstract- ***Digital learning can reduce geographical barriers to educational resources, but its benefits depend on school-level infrastructure, connectivity, teacher capacity and the social context in which students learn. This paper examines digital learning readiness and educational equity in Giridih District, Jharkhand, with particular attention to differences that may affect urban and rural schools. A descriptive secondary-data design was adopted. Evidence was compiled from the official Giridih District education portal, the district school inventory and block-wise school status documents, district educational indicators, selected school mandatory-disclosure pages, the Unified District Information System for Education Plus (UDISE+) 2023-24 national report, and Government of India digital-education initiatives. The analysis shows that Giridih has a wide school network and a long history of expanding access, but access alone does not guarantee equivalent digital learning conditions. Selected school disclosures demonstrate uneven connectivity: several schools report internet access and computer/science laboratories, whereas at least one selected rural school reports no internet facility. At the state level, UDISE+ 2023-24 reports computers in 57.2% of schools and internet in 53.9% of schools, indicating that digital readiness remains substantially below universal coverage. The paper argues that a district strategy for digital equity should combine reliable connectivity, shared device access, teacher training, offline-capable content, school-cluster support and monitoring of actual classroom use. The study does not claim causal effects or represent all Giridih schools; rather, it provides a transparent evidence-based profile to guide further field research and local planning.***

Keywords: Digital learning, digital readiness, urban-rural education divide, school infrastructure, educational equity, Giridih, Jharkhand

I. INTRODUCTION

Digital learning has become an important component of contemporary school education because it can extend access to instructional material beyond the physical classroom. Online platforms, digital textbooks, videos, simulations, learning-management systems, smart classrooms and mobile applications can support students when they are appropriately integrated with teaching. In India, this policy direction is reflected in the National Education Policy 2020, which gives explicit attention to technology integration and equitable online and digital education. National initiatives such as DIKSHA and PM e-VIDYA have also expanded the range of curriculum-linked resources that can be delivered through internet, television, radio and other modes.

However, digital education does not automatically remove inequality. A student can benefit from online resources only when several conditions are present together: electricity, a usable device, internet connectivity or an offline alternative, digitally competent teachers, appropriate content, and sufficient time and support for learning. These conditions are often distributed unevenly. Urban schools may have better connectivity and technology-support services, while rural schools may face unstable networks, fewer devices and longer distances for maintenance or technical support. At the same time, some well-resourced residential or model schools in rural areas may perform better than many urban schools. Therefore, the urban-rural divide should not be treated as a simple geographical difference; it is better understood as a multidimensional difference in access, infrastructure, capability and use.

Giridih District offers a useful context for such an analysis. The district administration reports an extensive school network and describes a decentralized educational system with block and cluster-level structures. At the same time, the district includes urban centres, semi-urban settlements and a large number of rural habitations spread across multiple blocks. This creates a practical need to examine whether the presence of schools is accompanied by the digital conditions required for equitable learning. The present article therefore moves beyond the broad argument that digital learning can bridge educational gaps and focuses on the specific question of digital readiness in Giridih.

The analysis is intentionally based on publicly available secondary data rather than invented survey responses. This is important because a reliable research article should distinguish between observed evidence and hypothetical results. The tables in this paper are reconstructed from government or school-disclosure sources, with the year and nature of each source clearly identified. Where a source is historical, it is used only as a baseline for understanding the growth and distribution of school access, not as a claim about the present number of functioning schools.

II. RATIONALE AND SIGNIFICANCE OF THE STUDY

The importance of studying digital readiness in Giridih arises from the difference between physical access to schooling and effective access to modern learning opportunities. A school may exist within reasonable distance of a habitation, yet students may still experience educational disadvantage if the school lacks internet connectivity, computers, digital content, trained teachers or reliable electricity. Digital learning therefore adds a new layer to the concept of educational equity. It shifts the policy question from “Is there a school?” to “Can students in different locations access comparable learning opportunities?”

This distinction is especially relevant for secondary and higher-secondary education. As students progress to more specialized subjects, they increasingly benefit from visual explanations, virtual laboratories, digital reference materials, career information, competitive-examination resources and opportunities to learn from teachers beyond their immediate locality. These resources can be particularly valuable in rural schools where specialist teachers or advanced instructional materials may be limited. At the same time, dependence on online platforms can deepen inequality when connectivity and device access are weak. Thus, digital learning can either reduce or reproduce the urban-rural divide depending on implementation conditions.

The study is also significant for district planning. A school-level digital strategy should not be based only on the number of devices purchased. It should consider whether devices are functional, whether internet is available during school hours, whether teachers use digital resources for pedagogy, whether students can access content outside school, and whether offline alternatives are available. By bringing together district-wide educational indicators, historical school-distribution data, current school disclosures and state-level UDISE+ benchmarks, this paper develops a structured evidence base for these planning questions.

III. OBJECTIVES OF THE STUDY

1. To describe the educational and school-access context of Giridih District using publicly available official data.
2. To examine selected school-level indicators of digital learning readiness, including internet availability, classrooms, laboratories and staffing.
3. To compare the observed Giridih school profiles with broader Jharkhand infrastructure benchmarks reported in UDISE+ 2023-24.
4. To identify major factors that can widen or reduce the urban-rural digital learning gap in the district.
5. To propose practical recommendations for improving equitable digital learning opportunities in secondary and higher-secondary schools of Giridih.

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DOI: https://doi.org/10.64388/IREV9I2-17122935

IV. RESEARCH QUESTIONS

1. What does the available district-level evidence indicate about the scale and distribution of school access in Giridih?
2. What differences are visible in digital and instructional infrastructure among selected schools for which public disclosure data are available?
3. How does the digital-infrastructure situation observed in selected Giridih schools relate to the wider Jharkhand benchmark?
4. Which infrastructure, pedagogical and social factors are most likely to shape digital learning equity in rural and urban settings?
5. What district-level measures can improve the effective use of digital learning rather than merely the availability of hardware?

V. METHODOLOGY

The study follows a descriptive and analytical secondary-data design. No primary questionnaire, experimental intervention or student test was conducted for this paper. The unit of analysis is the educational context of Giridih District, supplemented by selected school-level cases for which publicly accessible infrastructure data could be verified. The design is appropriate because the immediate purpose is to build a grounded district profile and identify researchable patterns before undertaking a larger field survey.

Five categories of sources were used. First, the official Giridih District education portal was used for administrative and school-access information. Second, the block-wise school status document published by the district administration was used as a historical baseline; it is explicitly dated November 2008 and is not presented as a current school census. Third, the district census-data page was used for literacy and school-attendance indicators. Fourth, mandatory-disclosure pages of selected Giridih schools were used to examine currently published school-level infrastructure and internet availability. Fifth, the UDISE+ 2023-24 national report was used to provide a Jharkhand-level benchmark for school infrastructure and digital facilities.

The analysis was conducted in three stages. In the first stage, district-level access indicators were organized into descriptive tables. In the second stage, selected school disclosures were compared on common variables, including the number of teachers, classrooms, laboratories and reported internet availability. In the third stage, the observed patterns were interpreted against Jharkhand-level UDISE+ indicators and national digital-education policy. No inferential statistical test is reported because the school cases are purposive examples rather than a probability sample of all Giridih schools. This limitation is central to the interpretation of the findings.

For data quality, the article distinguishes between official district data, school self-disclosures and state-level UDISE+ benchmarks. Historical figures are labelled with their date. Ambiguous disclosure fields are not converted into numerical claims. This approach avoids creating artificial precision and makes the analysis suitable as a foundation for a later survey-based study involving a stratified sample of urban and rural secondary schools.

VI. EDUCATIONAL PROFILE OF GIRIDIH DISTRICT

The official district education page reports 19 educational blocks corresponding to 13 community development blocks and four range circles. It also describes block resource centres and cluster-level educational structures. The same page states that primary schooling facilities have historically been available in 3,333 schools and that access to upper-primary schooling has been supported through 1,238 middle schools. Because the underlying block-wise document is dated November 2008, these counts should be interpreted as a historical access baseline rather than as a current UDISE school total. Nevertheless, they are useful for showing the scale and geographic spread of the education system that later digital initiatives must serve.

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Table 1. Selected District-Level Education Indicators for Giridih

Indicator	Giridih	Jharkhand	Source year
Literacy rate, age 7+ (%)	63.1	66.8	Census 2011
Male literacy, age 7+ (%)	76.8	76.8	Census 2011
Female literacy, age 7+ (%)	48.7	55.4	District page / AHS
Boys aged 6-17 currently attending school (%)	92.9	91.6	AHS 2012-13
Girls aged 6-17 currently attending school (%)	92.0	91.8	ASER 2012-13
Children aged 6-14 out of school (%)	3.2	4.4	ASER 2011
Children aged 6-14 in private school (%)	19.6	15.5	ASER 2011

Source: District Giridih, Government of Jharkhand, "Census Data 2011" education indicators page. Values are reproduced as published on the district portal.

The district indicators reveal two relevant features. First, school participation among children was already high in the published attendance measures, but female literacy was substantially below the state figure. Second, the difference between attendance and literacy suggests that access to school does not always translate automatically into equivalent learning outcomes. In the digital era, the same lesson applies: providing a device or a connection does not by itself ensure meaningful educational use. Equity must be evaluated in terms of participation, quality and learning capability.

Table 2. Historical Block-wise School Availability in Giridih District (as on November 2008)

Block	Existing MS	Upgraded MS 2003-04 to 2008-09	Total MS/UMS	PS	UPS	Total PS/UPS	Grand total
Giridih	30	100	130	49	184	233	363
Bengabad	13	69	82	36	138	174	256
Gandey	10	86	96	23	141	164	260
Pirtand	9	84	93	1	155	156	249
Dumri	13	100	113	20	160	180	293
Bagodar	16	114	130	15	184	199	329
Birni	11	81	92	7	116	123	215
Dhanwar	16	86	102	22	140	162	264
Jamua	23	106	129	19	219	238	367

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DOI: https://doi.org/10.64388/IREV9I2-17122935

Deori	15	99	114	44	169	213	327
Tisri	10	70	80	5	120	125	205
Ganwa	10	67	77	24	104	128	205
Total	176	1062	1238	265	1830	2095	3333

Source: District Giridih, "Blockwise Status of School (As on Nov. 2008)." The six annual upgraded-middle-school columns published for 2003-04 to 2008-09 have been summed for compact presentation. This is a historical baseline, not a current school census.

The block-wise table illustrates why digital planning in Giridih is a scale problem as well as a technology problem. Even in the historical baseline, the district education system was distributed across a large number of schools and multiple blocks. A centralized model in which each school independently solves connectivity, maintenance and teacher-support problems is therefore unlikely to be efficient. Cluster-based support, shared technical personnel, offline content synchronization and block-level monitoring may be more realistic for a geographically dispersed system.

VII. SCHOOL-LEVEL DIGITAL READINESS: ILLUSTRATIVE CASES

School mandatory-disclosure pages provide a useful, though incomplete, window into current digital readiness. The following table uses four schools for which the public disclosures provide comparable information. These schools are not treated as a representative statistical sample; they are illustrative cases selected to show the range of infrastructure conditions visible within the district. The comparison also demonstrates why district-wide conclusions should not be based on a single urban school or a single rural school.

Table 3. Selected Giridih School Infrastructure and Connectivity Profile

School	Location / area	Teaching staff	Classrooms	Laboratory information	Internet
Sir J.C. Bose CM School of Excellence Girls	New Barganda, Giridih	34 (PGT 8, TGT 25, PRT 1)	36	4 laboratories including computer labs	Yes
KGBV CM School of Excellence, Giridih	Mahthadih, Kamarsali	14 (PGT 1, TGT 11, PRT 2)	9	2 computer labs + 3 science labs	Yes
District CM School of Excellence, Pachamba	Telodih, Giridih	26 (PGT 10, TGT 16)	22	5 laboratories	Yes
CM School of Excellence, Dumri	Balthariya, P.O. Nagri, Dumri	12 TGT	40 (disclosure field: 40/40)	Laboratory field not separately interpretable	No

Source: Official school mandatory-disclosure webpages for Sir J.C. Bose CM School of Excellence Girls, KGBV CM School of Excellence Giridih, District CM School of Excellence Pachamba, and CM School of Excellence Dumri. Data are reported as displayed by the schools; ambiguous fields are not reinterpreted.

Three of the four selected schools report internet access, while the Dumri school disclosure reports no internet facility. This small illustrative comparison cannot be converted into a district percentage, but it demonstrates the practical meaning of the digital divide: students enrolled in schools with similar

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DOI: https://doi.org/10.64388/IREV9I2-17122935

curricular expectations may face different opportunities to use online resources. The presence of laboratories and classrooms is also uneven, and staffing patterns differ considerably. Such differences matter because digital learning requires both physical resources and instructional support.

A useful comparison is Jawahar Navodaya Vidyalaya Gandey, a rural residential school for classes 6-12. A publicly available UDISE+-based school report card lists 506 students, 14 teachers, 34 classrooms, 39 computers, 23 smart classrooms and internet connectivity. The same source explicitly states that its scoring system is computed by the publisher and is not an official government rating. For that reason, this paper uses the underlying facility counts only as an additional case illustration, not the website's composite score. The case is important because it shows that rural location does not necessarily imply poor digital infrastructure when a school receives focused institutional investment.

Table 4. Additional Rural Case: Jawahar Navodaya Vidyalaya Gandey

Indicator	Published value
Classes	6-12
Total students	506
Teachers	14
Classrooms	34
Computers	39
Smart classrooms	23
Internet connectivity	Yes
Computer lab	Available
Science lab	Available

Source: UDISE+-based public school report card for Jawahar Navodaya Vidyalaya Gandey. The publisher states that facility data are sourced from UDISE+ and that its ratings are not official government ratings; ratings are therefore excluded from this paper.

VIII. JHARKHAND BENCHMARK FOR DIGITAL AND BASIC SCHOOL INFRASTRUCTURE

District evidence should be interpreted within the wider state context. UDISE+ 2023-24 provides a useful benchmark for Jharkhand school infrastructure. The report indicates that basic facilities such as drinking water and toilets are close to universal coverage, but digital infrastructure is much less widespread. Computer and internet availability are particularly important because they define the minimum institutional conditions for regular digital learning.

Table 5. Selected Jharkhand School Infrastructure Indicators, UDISE+ 2023-24

Infrastructure indicator	Schools with facility (%)
Electricity connection	91.8
Drinking water	98.3
Toilet facility	98.6
Girls' toilet facility	97.2
Hand-wash facility	94.7
Playground	82.4
Computer facility	57.2
Internet facility	53.9
CWSN-friendly toilets	34.4
Ramps with handrail for CWSN students	52.3
Library / reading corner / book bank	89.0
Rainwater harvesting system	28.4

Source: UDISE+ 2023-24, Ministry of Education, Government of India. Figures are Jharkhand-level

percentages and are used as a contextual benchmark, not as Giridih-specific values.

The difference between basic facilities and digital facilities is striking. While more than nine out of ten schools in Jharkhand report electricity, drinking water and toilets, only 57.2% report computers and 53.9% report internet. This pattern suggests that the next stage of educational infrastructure development is not only about school buildings and basic amenities; it is increasingly about digital capacity, reliability and use. The selected Giridih cases fit within this broader picture: some institutions show strong connectivity, while others remain outside regular internet-based learning.

IX. ANALYSIS AND DISCUSSION

9.1 From Physical Access to Digital Access

Giridih's historical school network indicates substantial progress in physical access. The district administration notes that primary schooling facilities were available close to habitations and that middle-school access had been expanded. Yet digital access introduces a different geographical logic. A school building can be established once and remain usable for many years, whereas digital infrastructure requires continuing expenditure on connectivity, devices, electricity, software updates, security and maintenance. Rural schools may therefore experience a recurring rather than a one-time infrastructure disadvantage.

This distinction is important for policy. Counting schools with an internet connection is useful, but it does not reveal connection speed, downtime, affordability, the number of usable devices or whether students actually use the connection for learning. Similarly, a computer laboratory may exist but remain underused because of timetable constraints, lack of technical support or limited teacher confidence. Digital equity should therefore be measured through a combination of availability, functionality, frequency of use and learning integration.

9.2 Teacher Capacity as a Bridge between Infrastructure and Learning

Technology produces educational value only when teachers can integrate it with pedagogy. The selected school disclosures show substantial differences in staffing and teacher-section ratios. Schools with fewer teachers may find it difficult to allocate staff for computer laboratories, digital-content curation or blended-learning support. Conversely, a school with good infrastructure may still obtain limited learning benefit if digital tools are used only for presentations rather than for inquiry, practice, feedback and differentiated learning.

A district digital-learning strategy should therefore treat teacher professional development as core infrastructure. Training should include not only how to operate devices but also how to select appropriate digital resources, combine online and offline activities, evaluate information quality, support students with different levels of digital access, and protect privacy and online safety. DIKSHA and other national platforms can support this work, but the quality of implementation depends on local mentoring and follow-up.

9.3 Why Rural Location Should Not Be Used as a Proxy for Low Quality

The Giridih cases also caution against assuming that every rural school is digitally weak. Jawahar Navodaya Vidyalaya Gandey, for example, is situated in a rural context yet reports substantial digital infrastructure. Model and residential schools may receive concentrated investment that enables strong technology access. At the same time, ordinary rural schools may have weaker connectivity. Therefore, future research should classify schools by actual digital readiness rather than by location alone. Urban-rural comparisons are still useful, but they should be complemented by variables such as school management, enrolment size, electricity reliability, device density, teacher training and network quality.

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DOI: https://doi.org/10.64388/IREV9I2-17122935

9.4 Device Availability and Shared Access

The state-level UDISE+ figure of 57.2% of schools with computer facilities indicates that many schools still lack an institutional computer base. Even where computers are present, student-to-device ratios may be high. In such settings, digital learning cannot depend solely on one device per learner. Rotational laboratory schedules, teacher-led projection, shared tablets, downloadable content, local servers and offline learning packages can provide practical alternatives. A flexible architecture is especially important in Giridih because connectivity conditions may vary sharply across blocks and settlements.

9.5 Connectivity, Offline Learning and Multi-Mode Delivery

The PM e-VIDYA framework is relevant because it recognizes that equitable digital education requires multiple delivery modes rather than internet-only solutions. Television, radio, downloadable resources and mobile-friendly content can reduce exclusion where broadband is limited. For Giridih, a practical model would allow schools to download DIKSHA resources when connectivity is available and reuse them offline during classroom instruction. This approach reduces dependence on continuous high-speed internet while still expanding access to high-quality content.

9.6 Educational Equity and the Gender Dimension

The district's published educational indicators show a historically lower female literacy rate than the state average, even though school attendance among girls aged 6-17 was reported at a high level. This suggests that equity should be monitored across both access and outcomes. Digital education can create additional opportunities for girls through flexible access to academic resources, career information and skill development, but it can also reproduce household-level inequalities if personal device access is unequal. School-based digital facilities are therefore particularly important because they can provide a common access point independent of household ownership.

X. RECOMMENDATIONS

1. Develop a Giridih Digital Readiness Register. The district should maintain a school-wise dashboard covering internet status, electricity reliability, number of functional computers, smart-classroom equipment, device-to-student ratio, computer-lab functionality and frequency of digital use. Data should be updated periodically rather than treated as a one-time infrastructure inventory.
2. Prioritize schools with no or unreliable internet. Schools reporting no internet should receive targeted connectivity support, but the plan should also include offline content delivery so that instruction does not stop during network failure. Block-level resource centres can act as synchronization and technical-support hubs.
3. Strengthen teacher digital pedagogy. Training should focus on classroom integration, not only basic computer operation. Teachers should practice using DIKSHA resources, digital assessment, subject simulations, multimedia explanation, safe internet use and blended lesson planning.
4. Use cluster-based device and maintenance models. Where individual schools cannot sustain specialized technical support, clusters of nearby schools can share technicians, backup devices, projectors and scheduled maintenance. This can reduce downtime and improve the return on infrastructure investment.
5. Monitor actual use, not only availability. A functional monitoring system should record how often digital resources are used in teaching, which classes and subjects benefit, and whether rural and urban students receive comparable exposure. Usage indicators are more informative than hardware counts alone.
6. Protect equity for students without home devices. Digital homework should not assume that every learner has a smartphone or stable data connection. Schools should provide supervised access periods, downloadable materials, printed alternatives and peer-supported learning so that home connectivity does not determine academic participation.
7. Build local and multilingual content pathways. Digital resources should be usable in languages and formats familiar to students. Teachers can curate national resources and supplement them with locally

relevant examples, especially for science, environment, livelihoods and social studies.

8. Conduct a district-level field study. The next phase should collect primary data from a stratified sample of government and private secondary schools across urban, semi-urban and rural blocks. Student digital access, teacher ICT competency, frequency of digital teaching and academic engagement can then be tested statistically.

XI. LIMITATIONS OF THE STUDY

The study is limited by the nature of public secondary data. The historical block-wise school status document is dated November 2008 and cannot be used as a current school census. The selected mandatory-disclosure schools are illustrative cases and do not form a statistically representative sample of Giridih. School disclosures may also differ in the level of detail provided, and the existence of a facility does not prove regular classroom use. The Jharkhand UDISE+ percentages are state-level benchmarks and should not be interpreted as district-specific estimates. Finally, because no student achievement or teacher-competency data were collected, the study does not test the causal effect of digital learning on academic performance.

These limitations do not reduce the usefulness of the analysis; rather, they define the next research step. A carefully designed primary survey can use the present secondary-data profile to select blocks, schools and variables. It can also validate whether school-level digital facilities are functional, accessible to students and meaningfully integrated with teaching.

XII. CONCLUSION

Digital learning has the potential to narrow educational differences between urban and rural schools, but its impact depends on the conditions under which technology is provided and used. Giridih has an extensive and geographically dispersed education system, making equitable digital provision a district-level coordination challenge. Publicly available school disclosures show that some institutions have internet access and laboratory facilities, while others still report connectivity gaps. The wider Jharkhand UDISE+ benchmark reinforces this concern, with computer and internet facilities available in only a little over half of schools in 2023-24.

The central implication is that digital equity cannot be achieved by hardware distribution alone. Reliable connectivity, functional devices, teacher competence, accessible content, offline alternatives, technical maintenance and monitoring of classroom use must operate together. Giridih can benefit from a cluster-based approach that combines school-level readiness mapping with block-level support and national digital platforms such as DIKSHA and PM e-VIDYA. Such an approach would move the district from simple digital availability toward meaningful digital learning opportunity.

Future empirical research should compare urban and rural secondary schools using a representative sample and measurable indicators of student access, teacher ICT competency, digital teaching frequency, engagement and academic performance. The present study provides a transparent secondary-data foundation for that work while avoiding unsupported claims about outcomes that have not yet been directly measured.

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