 ISSN: 3139-1141

Hurdles in Access to Higher Education for Hearing-Impaired Individuals in India

Problems, Structural Gaps, and Strategic Solutions

Sakshi Bhujbal[#1], Prashant Bodke[#2], Diksha Boravdekar[#3]
Department of Master of Computer Applications (MCA)
Zeal Institute of Business Administration, Computer Application & Research, Pune
Affiliated to Savitribai Phule Pune University (SPPU), Maharashtra, India
[1]sakshib8459@gmail.com, [2]bodkeprashant47@gmail.com, [3]dikshaboravadekar@gmail.com
ORCID: 0009-0007-4474-7404, 0009-0009-7629-5371, 0009-0003-3875-3403

***Abstract*—In the Indian system of higher education, Deaf and Hard of Hearing (DHH) students face deep institutional and educational exclusion that systematically undermines the mandated statutory inclusion measures. This study is aimed at analyzing the hierarchical systemic limitations preventing DHH students on college campuses throughout India. With the use of a secondary descriptive methodological approach, we analyze the statutory provisions, administrative policies, parliamentary data and the results of field studies. The main results of our analysis show a clear gap between the existing statutory measures that provide progressive measures as per the RPwD Act 2016 and NEP 2020 and the absence of Indian Sign Language (ISL) interpretation services, speech-to-text services, appropriate evaluation methods and well-trained academic disability units in colleges. We analyze comparative accommodations in the US, UK and South African systems of education and outline sustainable approaches relevant to resource-scarce Indian colleges. Moreover, we analyze the application of assistive pipelines and software architecture by computer applications departments without resorting to unsupported techno-solutionism. Finally, the study will test five qualitative hypotheses, design an end-to-end student support pipeline and outline an institutional roadmap.**

***Keywords*—Deaf higher education; Indian Sign Language (ISL); RPwD Act 2016; Universal Design for Learning (UDL)**

I. INTRODUCTION

Higher learning enables social mobility, technological skill, and civic engagement. For Deaf and Hard-of-Hearing (DHH) people, admission to a college or university should mean the same thing – an open pathway to autonomy. But in India, once admitted, the classroom door effectively stays shut.

Speech-based instruction predominates within Indian higher learning institutions. Lectures occur at brisk speeds, debate sessions are disjunctive, and institutional video presentations almost never include synchronised closed captions. If a DHH student enters such an educational space without access to sign language interpreters, captionists, visual note-taking methods, or flexible testing formats, then their learning experience quickly deteriorates into fatigue and solitude.

Legislation exists on paper. Equal opportunities are enshrined within the Indian Constitution, but this is only a shallow compliance. Higher learning institutions in India habitually consider inclusive education a quota within their admissions process rather than an active responsibility. This paper examines the aforementioned disparity between legislation and practice.

II. INSTITUTIONAL CONTEXT, RESEARCH GAPS, OBJECTIVES, AND HYPOTHESES

A. Statutory and Policy Architecture

The statutory scaffolding governing disability rights in Indian education has expanded over the past decade. Table I summarizes the primary instruments shaping higher education access for DHH students.

TABLE I. PRIMARY STATUTORY AND POLICY FRAMEWORKS GOVERNING DHH HIGHER EDUCATION IN INDIA

Framework / Mandate	Key Provisions and Statutory Scope
Right of Persons with Disabilities (RPWD) Act, 2016	States that all educational establishments should provide inclusive education (Section 16). States that both the government and government-aided higher education establishments must allocate not less than 5 percent seats to people with benchmark disabilities (Section 32).
Judgement by Supreme Court of India (2017)	Ensure rigorous implementation of Section 32 quotas each year at tertiary institutions, making clear that the lack of reasonable pedagogical accommodation amounts to discrimination.
National Education Policy (NEP) 2020	Recommends the standardization of Indian Sign Language (ISL) at the national level and mandates state governments to develop quality materials for the hearing impaired.
UGC Accessibility Guidelines (2022)	Guides educational institutions on how to remove infrastructural barriers, ensure that digital resources are accessible, offer assistive technology, and measure inclusion measures.
ISLRTC Guidelines (Founded in 2015)	Charges the Indian Sign Language Research and Training Center to standardize ISL, publish national dictionaries, and conduct interpreter training courses.

These legal provisions guarantee seat reservations, but physical presence does not equal comprehension. As Bansal [1] observes, affirmative action decoupled from accessibility creates an empty gesture: students gain campus entry only to be stranded in classrooms that fail to communicate with them.

B. Research Gap

Though disability studies in India have focused on physical accessibility and blindness, DHH students have been neglected in the academic discourse. Previous research has a habit of clubbing all types of impairments together under one general

category without recognizing the unique needs that come with the language requirement of sign languages. In particular, higher education literature does not have detailed analyses of: (1) lack of ISL interpretation certification at the tertiary level; (2) captioning inaccuracy of multilingual lectures in colleges; (3) examination accommodation facilities; and (4) workflow in disability cells.

C. *Research Objectives*

The current study seeks to achieve seven interrelated goals:

1) Investigate the structural, language-based, and procedural barriers that the DHH learners face in Indian universities.
2) Critically examine the everyday breakdowns in communication within the lectures, laboratory work, and among peers.
3) Estimate the number of certified interpreters for ISL and instructional media available at the universities.
4) Conduct an analysis of the institution's governance and budget allocations, and disability support services.
5) Point out the systemic failure in the evaluation process, practical vivas, and university digital portals.
6) Conduct a comparative international analysis and find best practices in the US, UK, and South Africa.
7) Create a phased implementation model for Indian universities.

D. *Research Hypotheses*

Considering our descriptive approach and use of secondary data, we assess five specific hypotheses through qualitative means.

- **Hypothesis 1 (H1):** DHH students in Indian higher education encounter acute communication barriers driven primarily by the severe national shortage of certified, tertiary-qualified ISL interpreters.
- **Hypothesis 2 (H2):** Standard curricular assets, examination formats, and institutional portals lack fundamental accessibility provisions, directly depressing DHH academic performance.
- **Hypothesis 3 (H3):** A persistent disconnect divides statutory inclusion mandates from ground-level institutional practice due to undefined fiscal responsibilities and absent administrative mechanisms.
- **Hypothesis 4 (H4):** Pervasive lack of deaf awareness among faculty, administrative staff, and peers—combined with the absence of active campus disability cells—intensifies psychological alienation and academic attrition.
- **Hypothesis 5 (H5):** While automated digital technologies (such as automatic speech recognition and remote video platforms) provide valuable supplementary support, they cannot substitute for qualified human interpreters in complex university environments.

III. Methodological Strategy and Conceptual Grounding

A. *Data Corpus and Analytical Procedure*

This study employs descriptive and qualitative synthesis. We gathered and cross-examined evidence across five primary categories: (1) statutory and regulatory texts including the RPwD Act 2016, NEP 2020, UGC Guidelines 2022, and Supreme Court rulings; (2) government reports and parliamentary records from AISHE, MHRD/MoE, and Lok Sabha questions; (3) specialized agency publications from ISLRTC; (4) peer-reviewed field studies examining Indian deaf education (e.g., Athaley et al. [2]) alongside international case analyses; and (5) technical standards including WCAG 2.1 [3] and speech-to-text benchmark literature [4]. We systematically categorized qualitative data into distinct operational domains: classroom instruction, assessment design, interpreter availability, campus infrastructure, and software usability.

B. *Conceptual Framework*

Our critique rests upon four complementary theoretical pillars (Fig. 1).

1. Social Model of Disability The barrier resides in an uncaptioned, exclusively oral environment—not in the student's ears. The university holds the primary duty of pedagogical adaptation.	**2. DHH Heterogeneity** Recognizes the critical distinction between culturally Deaf signers and hard-of-hearing students using residual hearing, hearing aids, and real-time text.
3. Universal Design for Learning Multi-modal course delivery (advance lecture slides, captions, multiple demonstration formats) designed upfront, reducing the need for ad-hoc adjustments.	**4. Human Rights & Law** Grounds accessibility in UNCRPD Articles 9, 21, and 24 and the RPwD Act 2016 as an enforceable civil right rather than discretionary charity.

Fig. 1. Four-pillar conceptual framework for inclusive higher education.

1) **The Social Model of Disability:** Disability does not stem from an individual's sensory pathology; it is produced when an inflexible social environment encounters an atypical human body. The barrier in an engineering or business lecture is not a student's lack of hearing, but rather the professor's uncaptioned, exclusively oral delivery. The burden of adaptation belongs entirely to the university.
2) **Heterogeneity of DHH Identities:** DHH students do not constitute a monolithic cohort. Culturally Deaf students treat ISL as their primary language and view themselves as a linguistic minority. Conversely, hard-of-hearing learners often rely on residual hearing, cochlear implants, acoustic loop systems, and real-time text, with little to no sign proficiency. Interventions tailored exclusively to one group leave the other stranded. Personalized baseline assessments must precede all service delivery.
3) **Universal Design for Learning (UDL):** Rather than treating accommodation as an afterthought for individual students, instructors must build multi-modal access into course delivery from day one. Offering lecture outlines in advance, screening captioned media, and providing multiple demonstration options benefits not only DHH students, but also second-language speakers and neurodivergent learners.

4) **Human Rights and Statutory Entitlement:** India ratified the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) in 2007, committing to ensure inclusive education (Article 24), accessible information (Article 9), and the formal recognition of sign language (Articles 21 and 24). Under the RPwD Act 2016, providing communication access is an enforceable civil right, not an optional charity.

C. *Proposed Primary Data Collection Protocol*

To build on this secondary analysis, we designed a mixed-methods empirical field framework for subsequent research phases:

- **Sampling Strategy:** Given the dispersed DHH population in higher education, researchers will employ purposive and snowball sampling through collegiate alumni networks, state deaf associations, and vocational training centers.
- **Accessible Instrumentation:** Questionnaires will be deployed across four linguistic channels: written English, Hindi, Marathi, and recorded ISL video prompts. In-depth interviews will take place either through certified ISL interpreters or via synchronized real-time text chat, depending on participant preference.
- **Participatory Ethics and Privacy:** Informed consent will be collected in the participant's preferred medium. Considering small cohort sizes, strict anonymization and data aggregation are necessary to prevent deductive identification. Crucially, deaf community advisors will audit all survey instruments prior to rollout.

IV. Empirical Synthesis and Critical Thematic Analysis

A. *Enrolment Realities: The Broken Funnel*

The demographic pipeline for deaf learners in India contracts sharply before college entry. While the 2011 Census registered roughly 50 lakh deaf individuals nationally, educational participation drops precipitously at each academic milestone.

In the 2018–19 All India Survey on Higher Education (AISHE), students with disabilities accounted for just 85,877 of total enrolments—a negligible 0.2% across all tertiary institutions [5]. DHH learners form an even smaller fraction of this cohort. A landmark University of Cambridge study [6] revealed that vast numbers of deaf Indian children never complete primary education, stymied by a nationwide network of only 387 specialized deaf schools. Consequently, the handful of DHH students reaching college encounter an environment unprepared for their presence.

B. *Early Language Deprivation and Communication Friction*

Over 90% of deaf children are born to hearing parents who have no prior exposure to sign language [7]. When combined with primary schools that enforce rigid oralism—demanding speech and lip-reading while forbidding manual signs—students arrive at adulthood with delayed language acquisition.

In university classrooms, oralism fails completely. Lip-reading captures barely 30% to 40% of spoken phonemes under ideal conditions, deteriorating further when professors pace across the dais, turn to write on whiteboards, or speak behind podiums. Athaley et al. [2], studying DHH students within an Indian visual arts academy, documented how unaddressed communication friction locked capable learners out of theoretical coursework and studio critiques.

C. *The Critical Shortfall of Certified ISL Interpreters*

Classroom access relies heavily on professional sign language interpreters. In India, this workforce is almost nonexistent. According to ISLRTC records, fewer than 300 to 325 certified interpreters exist for the entire country [8], [9]. Formal training programs admit tiny cohorts—frequently capped at roughly 15 trainees per center. Furthermore, very few certified interpreters possess the academic vocabulary required for advanced collegiate subjects such as computer science, macroeconomics, or corporate law. Even when a college genuinely seeks to hire an interpreter, the regional market cannot supply one.

D. *Inaccessible Curricular Materials and Captioning Deficits*

Instructional assets in Indian colleges are predominantly auditory and text-dense. Recorded lectures, instructional YouTube modules, and MOOCs are routinely uploaded without human-verified closed captions. Recent governmental initiatives, such as the digitization of NCERT schoolbooks into ISL [10] and the launch of the PM eVIDYA DTH sign language channel [11], represent welcome progress. However, these initiatives focus almost exclusively on primary and secondary schooling. Tertiary-level academic resources remain unaddressed. Even when automated closed captions are present, DHH learners struggle without explicit instruction on how to manage the visual split between caption streams and complex presentation slides [12].

E. *Structural Failures in Examinations and Digital Portals*

Collegiate assessment methods remain rigidly oral-auditory:

- **Vivas and Oral Presentations:** Practical evaluations in courses like computer applications frequently hinge on spontaneous oral defenses. Without accommodations, deaf students receive poor marks that reflect communicative barriers rather than a lack of subject knowledge.
- **Listening Assessments:** Mandatory language courses regularly include listening comprehension components with no alternative evaluation options.
- **Administrative Portals:** Modern campuses manage admissions, fee payments, and hall tickets through web portals that often use uncaptioned audio captchas, require phone-based verification, or fail basic WCAG accessibility audits [13].

F. *Institutional Inaction, Bureaucratic Absence, and Attitudinal Friction*

Very few Indian colleges maintain an operational, funded Equal Opportunity Cell or Disability Support Office. Parliamentary inquiries reveal that university inspection checklists track physical wheelchair ramps while ignoring communication accessibility [14]. Faculty members often mistake deafness for intellectual impairment, viewing accommodation requests as unfair advantages or academic

dilution. Outside the lecture hall, peer isolation runs deep. Drawing parallels from South African universities, Percival et al. [15] demonstrated that negative peer attitudes, inaccessible campus social events, and rigid teaching styles systematically push DHH students into depression and eventual dropout.

G. Synthesis of Core Structural Barriers

Table II synthesizes the six operational failure points identified across Indian colleges.

TABLE II. MATRIX OF STRUCTURAL BARRIERS CONFRONTING DHH UNIVERSITY STUDENTS

Operational Domain	Primary Structural Failure	Key Sources and Evidence
Classroom Pedagogy	Predominantly oral instruction; total lack of ISL signing or speech-to-text CART services.	[6], [2]
Human Resources	Nationwide deficit of certified educational interpreters (fewer than 325 registered).	[8], [9]
Instructional Media	Tertiary lectures, video repositories, and course syllabi lack verified captioning or ISL glosses.	[10], [11]
Examination Systems	Compulsory spoken vivas and uncaptioned listening tests conducted without accommodations.	[13]; UGC (2022)
Digital Infrastructure	University portals, LMS platforms, and notice boards rely heavily on auditory or phone-only alerts.	UGC Accessibility Guidelines (2022)
Campus Environment	Absence of dedicated disability coordinators; pervasive peer misunderstanding and social alienation.	[1], [15]

H. End-to-End Student Lifecycle Barrier Matrix

Barriers do not occur in isolation; they compound as a student moves through college. Table III maps these challenges across the complete academic lifecycle.

TABLE III. LIFECYCLE BREAKDOWN OF DHH STUDENT EXPERIENCES IN HIGHER EDUCATION

Academic Stage	Necessary Accommodation	Observed Institutional Reality
Pre-Admission	Information packages in plain text and ISL video; accessible outreach materials.	Severe early language delays; institutional prospectuses and admission videos lack captions.
Induction & Registration	Structured, confidential intake to assess individual needs; designated departmental liaison.	Admissions focus entirely on quota seat allocation; zero evaluation of individual communicative needs.
Lecture Instruction	Qualified ISL interpreters or CART captioners; lecture outlines provided in advance.	Chronic shortage of interpreters; professors lecture without visual aids or microphones.
Laboratory & Group Work	Visual demonstration protocols; clear written lab briefs; peer sensitization.	Chaotic acoustic environments; background noise drowns out speech; peers rarely know how to communicate.
Assessments & Vivas	Written alternatives to oral vivas; extra time allowance; sign-interpreted defense.	Rigid oral exam boards; student answers misjudged as deficient due to speech articulation differences.
Digital & Online Learning	WCAG 2.1-compliant portals; high-accuracy captions; non-auditory emergency alerts.	LMS platforms host uncaptioned audio lectures; administrative notices sent via phone calls.
Campus Residential Life	Visual fire alarms in hostels; vibration alert systems; inclusive student clubs.	Near-complete absence of visual emergency alerts, creating serious safety risks in residential halls.
Internship & Placement	Interpreted interview sessions; employer sensitization workshops.	Placement offices lack accommodation protocols; recruiters hold unexamined biases against non-speaking candidates.

I. Intersectionality and Latent Marginalization

The severity of these barriers depends heavily on socioeconomic background. Students from rural communities, families with limited financial resources, or vernacular-medium schooling encounter compounded disadvantages. A wealthy urban student may purchase digital hearing aids, speech therapy, and private laptops; a rural first-generation learner has no such safety net.

Hard-of-hearing students who use speech rather than sign often deliberately hide their condition. Fearing social stigma or academic prejudice, they avoid requesting front-row seating or assistive listening systems [15]. When an institution relies on students to step forward and self-advocate without offering a private, supportive intake process, these learners suffer in silence.

J. Ground-Level Realities: Three Illustrative Academic Scenarios

Scenario A: The ISL User in a Postgraduate Computer Applications (MCA) Course. An intelligent student who uses ISL as their primary language enrolls in an MCA program. The lecturer teaches in rapid English mixed with colloquial Hindi, using specialized technical vocabulary like object-oriented encapsulation, polymorphism, and asynchronous callbacks—terms that lack established, standardized signs in regional ISL dialects. With no interpreter provided, the student stares at complex slides and copies handwritten notes from classmates days later.

Strategic Accommodation: The college contracts a dedicated interpreter for the term, shares slide decks 48 hours prior to each lecture, and arranges weekly 15-minute briefings between the instructor and interpreter to agree on technical sign conventions. Recorded lectures with verified captions are uploaded to the LMS for revision. The modest cost of this setup prevents an avoidable dropout.

Scenario B: The Hard-of-Hearing Student and the Dilemma of Non-Disclosure. A student with bilateral moderate-to-severe hearing loss manages reasonably well in a quiet secondary school. At university, however, classes meet in large 120-seat lecture halls fitted with loud ceiling fans, echoing concrete walls, and poor acoustic insulation. Unwilling to look different, the student sits quietly at the back, missing roughly half the spoken material.

Strategic Accommodation: The university establishes a confidential digital onboarding portal during admission. The student is offered priority front-row seating, lecturers wear

discreet FM wireless microphones paired directly to the student's hearing aid, and automatic transcripts are provided after class. The student receives equal access without unwanted attention.

Scenario C: Redesigning Viva and Language Evaluations. In an end-of-semester programming viva, an external examiner asks rapid, multi-part spoken questions. The DHH student, who communicates primarily through written English and ISL, struggles to articulate oral answers on the spot. The examiner misinterprets the student's hesitation and unconventional speech cadence as a lack of preparation, awarding a failing grade.

Strategic Accommodation: The examination board issues clear guidelines permitting alternative evaluation formats. The student is offered a choice: provide a live demonstration with a certified sign interpreter present, or submit real-time written responses via a shared terminal. The exam measures conceptual programming competence rather than speech production.

K. Comparative Global Perspectives and Strategic Takeaways

Table IV compares tertiary DHH support infrastructures across four national systems.

TABLE IV. CROSS-NATIONAL COMPARISON OF TERTIARY DHH SUPPORT INFRASTRUCTURES

Country	Statutory Foundation	Funding & Support Mechanism	Dedicated Institutions	Research Base
United States	Section 504 of Rehabilitation Act (1973); Americans with Disabilities Act (ADA, 1990).	Institutional obligation: universities must fund auxiliary aids, CART, and interpreters at zero direct cost to students.	Gallaudet University; NTID at Rochester Institute of Technology.	Comprehensive, longitudinal, and deeply funded.
United Kingdom	Equality Act (2010); Public Sector Accessibility Regulations.	Disabled Students' Allowances (DSA): public funding follows the student directly to pay for note-takers, assistive software, and interpreters.	Specialized support centers and disability cells integrated into all public universities.	Moderate to high; robust quality assurance audits.
South Africa	Post-Apartheid Constitution; Integrated National Disability Strategy.	University-funded disability units; persistent resource gaps and interpreter shortages mirror the Global South.	Integrated support cells within top-tier universities.	Developing; growing focus on multilingual deaf education.
India	RPwD Act (2016); UGC Guidelines (2022); NEP (2020).	Statutory duty placed on colleges; funding sources undefined; minimal central funding for auxiliary services.	National institutes (AYJNISHD) and special schools; virtually absent in mainstream tertiary bodies.	Extremely small; limited disaggregated empirical data.

India cannot simply copy Western models wholesale. The American approach depends on an extensive legal system and a large, well-funded workforce of certified interpreters. The British model relies on central treasury disbursements through the Disabled Students' Allowance. India's higher education system serves hundreds of languages across thousands of small, affiliated rural colleges operating on lean budgets. Solutions must therefore be decentralized: (1) **Consortia-Based Support:** Districts pool resources to share interpreter rosters; (2) **Student-Centered Funding:** Government scholarships include ring-fenced communication vouchers; (3) **Hybrid Remote Delivery:** Video Remote Interpreting (VRI) bridges geographical gaps while expanding local training.

L. Assistive Technology and Digital Inclusion

Table V summarizes the principal assistive technologies, their optimal applications, and their practical limitations.

TABLE V. TECHNOLOGICAL INTERVENTIONS: USE CASES AND OPERATIONAL CONSTRAINTS

Assistive Tool	Optimal Application	Primary Practical Limitations
Human Real-Time Captioning (CART)	Advanced lectures containing specialized vocabulary; students who prefer rapid reading over sign.	High per-hour professional cost; severe national shortage of trained stenographers.
Automatic Live Speech-to-Text (ASR)	Informative lectures, meetings, and seminars conducted in quiet rooms with high-grade audio.	Error rates spike dramatically with ambient noise, heavy regional accents, technical jargon, and code-switching.
Human-Corrected Lecture Captions	Asynchronous learning, MOOCs, and archived video materials hosted on university portals.	Requires dedicated editorial labor, structured quality control, and time delays before publication.
In-Person ISL Interpreters	Core seminars, lab practicals, viva defenses, and interactive collaborative discussions.	High fatigue rates (interpreters need rotation every 20–30 minutes); acute supply shortages.
Video Remote Interpreting (VRI)	Remote or rural campuses where no qualified local sign interpreter resides.	Dependent on stable broadband connections, careful screen management, and high-definition cameras.
Standardized ISL Glossaries	Subject orientation, common administrative instructions, and foundational terminology.	Vocabulary coverage in advanced scientific and technical disciplines remains very limited.
Signing Avatars / 3D Translation	Experimental, highly structured announcements with basic informational content.	Strongly discouraged by international deaf bodies (WFD/WASLI); lacks natural facial grammar and prosody.
Assistive Listening Systems (FM / Loops)	Hard-of-hearing students using hearing aids or cochlear implants in auditoriums.	Requires capital expenditure, consistent hardware maintenance, and equipment-compatible rooms.

Speech-to-text platforms integrated into tools like Microsoft Teams, Zoom, and Google Meet have lowered the cost of generating live text. In Indian college classrooms, however, out-of-the-box ASR faces severe challenges: acoustic noise from ceiling fans, code-switching between English and

regional languages, and domain-specific technical terminology. As Kushalnagar et al. [4] demonstrated, educational captions must meet strict thresholds for accuracy, low latency, and visual readability to be pedagogically useful. Uncorrected automated captions can mislead learners. While raw ASR serves as a helpful baseline, institutions must route recorded lectures through an editing pipeline before publishing them for revision.

Furthermore, engineering teams must not pursue assistive technology in isolation. The World Federation of the Deaf (WFD) and the World Association of Sign Language Interpreters (WASLI) have issued explicit cautions against using synthetic 3D signing avatars to replace human interpreters [16]. Sign languages rely heavily on three-dimensional spatial grammar, subtle head shifts, and facial expressions—nuances that synthetic avatars routinely fail to convey. Technologists must collaborate directly with native Deaf signers from day one, ensuring tools are developed *with* the community rather than *for* them (Fig. 2).

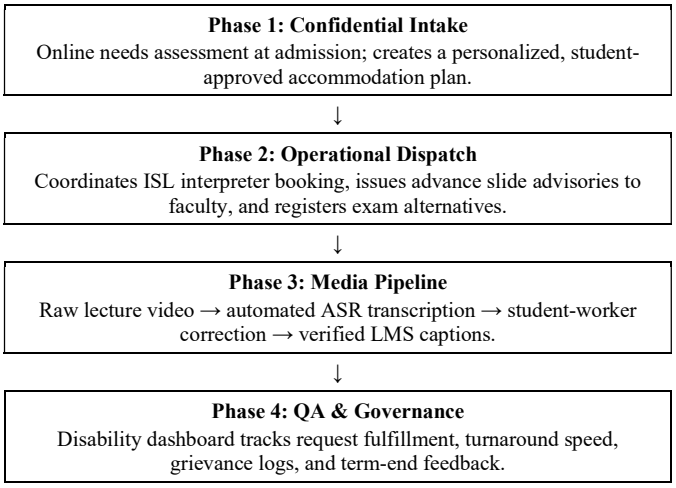

Fig. 2. Four-phase campus accessibility support workflow.

V. Strategic Recommendations and Implementation Roadmap

A. Recommendations for Colleges and Universities

1) **Formalize Interpreter Retainers:** Establish annual service contracts with certified ISL interpreters drawn from the official ISLRTC registry, guaranteeing reliable semester-long coverage rather than scrambling for ad-hoc support during exams.

2) **Launch University Interpreter Training Programs:** Universities with linguistics, education, or social work faculties should partner with ISLRTC to launch accredited diploma and degree courses, expanding the national pool of qualified educational interpreters.

3) **Standardize Lecture Captioning:** Mandate that all asynchronous instructional media uploaded to institutional repositories meet minimum WCAG captioning standards, deploying human-reviewed student-worker editing pipelines.

4) **Restructure Examination Rules:** Replace mandatory oral defenses with flexible formats, including signed presentations with interpreters, structured written submissions, and extended testing windows.

5) **Establish Dedicated Support Cells:** Appoint a full-time, trained Disability Officer with administrative authority and budget to coordinate accommodations across academic departments, examination boards, and student housing.

6) **Integrate DHH Student Governance:** Appoint DHH students and alumni to university advisory committees, ensuring they have formal input into accommodation policies and campus audits.

7) **Install Visual Safety Systems:** Upgrade dormitories, dining halls, laboratories, and lecture theaters with multi-color visual strobe fire alarms and synchronized text-alert systems.

B. Recommendations for Regulatory and Government Bodies

8) **Disaggregate National Educational Data:** Overhaul the annual AISHE survey to record specific disability categories, tracking DHH admissions, progression, and graduation rates alongside concrete accessibility metrics.

9) **Establish Dedicated Accessibility Grants:** The University Grants Commission (UGC) and Ministry of Education should create a targeted funding mechanism that provides colleges with matching funds to cover interpreter retainers and captioning software.

10) **Expand Tertiary ISL Vocabularies:** Provide dedicated funding to ISLRTC to accelerate the creation of specialized sign glossaries for higher-education disciplines, prioritizing computing, natural sciences, commerce, and law.

11) **Tie Accreditation to Real-World Compliance:** The National Assessment and Accreditation Council (NAAC) and National Institutional Ranking Framework (NIRF) must audit verifiable communication accommodations—such as interpreter availability and captioned lectures—rather than relying on self-reported paperwork.

C. Prioritized Strategic Action Plan

Table VI sets out a tiered action matrix with responsible agencies, timelines, and measurable indicators.

TABLE VI. Multi-Tiered Strategic Action Matrix

Priority	Strategic Action	Responsible Agency	Timeline	Measurable Indicator
Tier 1	Designate campus Disability Officer; publish accessible accommodation guide.	University Leadership; Registrar	0–6 Months	Officer named; policy in text and ISL video.
Tier 1	Implement confidential onboarding intake to evaluate communicative needs.	Campus Disability Cell	0–6 Months	% of DHH students with written plan.
Tier 1	Build vetted interpreter roster using ISLRTC national directory.	Disability Cell; Deans	0–6 Months	% of interpreting requests met on time.

Priority	Strategic Action	Responsible Agency	Timeline	Measurable Indicator
Tier 2	Mandate alternative evaluation plans (written vivas, extended time).	Controller of Examinations	0–6 Months	Zero unaccommodated exam grievances.
Tier 2	Conduct campus-wide deaf awareness training for staff and peers.	Student Affairs; Deaf Groups	6–12 Months	Total faculty and staff trained.
Tier 2	Deploy structured captioning pipeline for asynchronous video lectures.	Academic Computing; IT	6–12 Months	Share of online lectures with verified captions.
Tier 3	Revise AISHE reporting templates to capture disaggregated disability metrics.	Ministry of Education	6–24 Months	Updated AISHE publication with DHH data.
Tier 3	Issue central regulatory guidelines clarifying institutional funding.	UGC; DEPwD	6–24 Months	Binding reimbursement circulars issued.
Tier 4	Launch university degree programs in educational ISL interpretation.	ISLRTC; RCI	2–5 Years	Annual graduation figures of interpreters.
Tier 4	Standardize and distribute advanced academic ISL lexicons.	ISLRTC; University Consortia	2–5 Years	Published glossaries in STEM, law, commerce.

D. A 12-Month Rollout Roadmap for an Individual College

Institutions do not need to wait for national policy changes to take action. The following sequential phases outline an achievable path for any college:

- **Month 1 (Foundation):** Formally designate a faculty member as the campus Disability Officer. Review existing student records to identify enrolled DHH students. Publish a straightforward accommodation guide across campus in both written text and introductory ISL video.
- **Months 2–3 (Framework):** Develop confidential onboarding forms. Establish relationships with ISLRTC, local deaf associations, and regional freelance interpreters. Formalize written alternative viva protocols with the university examination board.
- **Months 4–6 (Deployment):** Begin providing scheduled interpreting services for the new semester. Launch a two-course pilot program testing real-time transcription and human-reviewed captioning. Run brief deaf awareness sessions for faculty and departmental staff.
- **Months 7–12 (Evaluation & Expansion):** Review service delivery data and student feedback. Refine accommodation plans based on actual classroom experience. Expand the captioning workflow to cover additional academic departments and share operational findings with neighboring institutions.

VI. Future Empirical Research Directions

Table VII lists priority agendas for future empirical fieldwork.

TABLE VII. Priority Agendas for Future Empirical Fieldwork

Core Research Inquiry	Recommended Methodological Approach	Primary Informants & Data Sources
National Demographic Mapping: What are actual enrolment, progression, and completion rates of DHH students?	Quantitative disaggregated demographic analysis of central and state higher education databases.	Ministry of Education; AISHE databases; State Higher Education Councils.
Classroom Experience Audits: How do DHH students evaluate the adequacy of current classroom accommodations?	Multilingual mixed-methods surveys and structured qualitative interviews using ISL video and text.	DHH undergraduates, postgraduates, and recent alumni.
Interpreter Workforce Metrics: What is the capacity, distribution, and subject expertise of active ISL interpreters?	National workforce surveys, institutional registry audits, and semi-structured practitioner interviews.	Certified interpreters; ISLRTC; RCI; training centers.
ASR Accuracy in Indian Multilingual Classrooms: How reliably do speech-to-text models perform in code-switched environments?	Empirical benchmarking comparing raw ASR outputs against human-corrected transcripts to measure Word Error Rates.	Recorded audio from diverse collegiate lectures; computing researchers; student review panels.
Economic Models of Support: What are actual annual costs of providing comprehensive accommodations across college tiers?	Comparative institutional expenditure analysis and funding model evaluations.	University finance departments; disability cells; assistive technology vendors.
Post-Graduation Outcomes: What career trajectories, employment barriers, and wage gaps confront DHH degree-holders?	Longitudinal cohort studies and employer perception surveys.	DHH alumni; corporate human resource departments; vocational rehabilitation agencies.

Future empirical investigations must avoid extractive research practices. Academic teams must partner with the Deaf community from the outset: (1) **Co-Design:** Deaf researchers and advisors must participate in formulating research questions, designing survey instruments, and interpreting findings; (2) **Equitable Compensation:** Deaf advisors, interpreters, and informants must be fairly compensated for their specialized expertise and time; (3) **Accessible Formats:** Research instruments and reports must be published in both simplified text and ISL video; and (4) **Community Value:** Findings must be shared back with participating deaf communities to support grassroots advocacy.

VII. Hypothesis Evaluation and Discussion

A. *Qualitative Evaluation of Hypotheses*

Table VIII summarizes the qualitative evaluation of the five hypotheses.

TABLE VIII. Qualitative Hypothesis Testing Matrix

Hypothesis	Key Empirical and Qualitative Indicators	Evaluative Conclusion
H1: Shortage of certified ISL interpreters creates severe communication barriers.	Fewer than 325 certified interpreters nationwide; training cohorts capped at ~15 trainees; documented communication breakdowns in college classrooms.	**Strongly Supported**
H2: Inaccessible learning materials and exams depress academic performance.	Widespread lack of lecture captioning; early-stage ISL resources limited to schoolbooks; compulsory oral vivas without alternative options.	**Strongly Supported**
H3: Disconnect between legal mandates and practice due to unclarified funding.	RPwD Act mandates are not backed by designated central budgets; official government audits track admissions quotas while ignoring services.	**Strongly Supported**
H4: Faculty and peer lack of awareness drives social and academic isolation.	Documented peer alienation and non-disclosure dilemmas; strong international parallels (South Africa), though Indian field data remains limited.	**Partially Supported**
H5: Assistive technology is valuable, but cannot replace qualified human interpreters.	ASR error rates spike with accents and background noise; WFD/WASLI explicit warnings against synthetic signing avatars in complex education.	**Strongly Supported**

B. *Integrated Discussion*

Our findings demonstrate that providing affirmative admission quotas without communication accessibility solves very little. While the RPwD Act 2016 guarantees seat reservations, it does not guarantee that a student can follow a fast-paced lecture. The structural hurdles cataloged across this study operate cumulatively: a student who arrives with language delays caused by childhood oralism is placed in a noisy lecture hall without an interpreter, given uncaptioned video materials, and ultimately graded down in an unaccommodated oral viva. This sequence routinely leads faculty to mistake an inaccessible learning environment for an intellectual limitation.

The validation of Hypothesis 3 underscores that the bottleneck is not a lack of statutory legislation, but an absence of funded operational mechanics. While the British model funds accommodations by attaching financial allowances directly to the student, Indian regulations leave funding responsibilities vague. Unclear budgets provide colleges with an easy excuse for inaction.

Similarly, the validation of Hypothesis 5 serves as an important reality check for computer science departments. Educational software, automatic speech recognition, and digital platforms provide valuable support, but they cannot replace qualified human professionals. Video captioning and speech-to-text algorithms must be deployed thoughtfully as components of a human-centered accessibility pipeline, developed alongside native Deaf signers to prevent unverified techno-solutionism.

VIII. Conclusion

Securing an admission letter does not guarantee an education. For Deaf and Hard-of-Hearing students in India, campus life too often means navigating classrooms designed as if they do not exist. Despite progressive statutory protections under the RPwD Act 2016 and NEP 2020, colleges continue to operate without certified sign language interpreters, captioned digital media, flexible assessment formats, or trained disability personnel.

Solving this systemic problem requires moving beyond passive admissions quotas. Real educational inclusion demands clear funding mechanisms, coordinated district interpreter pools, multi-modal classroom delivery, and strict accreditation audits that penalize inaccessible institutions. Assistive software and automatic speech recognition offer scalable support, provided they are built alongside deaf communities rather than treated as quick fixes. Indian higher education must recognize communication access as an enforceable civil right, ensuring that DHH scholars can enter university not merely to occupy a seat, but to learn, contribute, and succeed on equal terms.

References

[1] A. Bansal, "Affirmative action without accessibility: India's higher education system fails disabled students," *Oxford Human Rights Hub*, Jan. 10, 2019. [Online]. Available: https://oxfordhumanrightshub.blog/2019/01/10/affirmative-action-without-accessibility-indias-higher-education-system-fails-disabled-students/

[2] V. G. Athaley, A. J. Mishra, and I. Gupta, "Barriers and support to the inclusion of deaf and hard of hearing students in visual art higher education in India," *Academia*, vol. 33, pp. 3–27, 2023.

[3] World Wide Web Consortium (W3C), *Web Content Accessibility Guidelines (WCAG) 2.1*, W3C Recommendation, 2018. [Online]. Available: https://www.w3.org/TR/WCAG21/

[4] R. S. Kushalnagar, W. S. Lasecki, and J. P. Bigham, "Evaluation of classroom captions: Usability and performance metrics," *ACM Trans. Accessible Comput.*, vol. 5, no. 3, Art. 7, 2014, doi: 10.1145/2543579.

[5] Ministry of Human Resource Development, *All India Survey on Higher Education 2018-19 (AISHE)*. Government of India, 2019.

[6] University of Cambridge, "Study advises making Indian Sign Language official language and expanding dedicated schools for deaf learners," *Faculty of Education Research News*, 2025.

[7] Deaf24, "Only 5% in school: India's forgotten deaf children," Deaf24 Research Brief, 2025.

[8] Indian Sign Language Research and Training Centre (ISLRTC), "About us and national interpreter directory," Department of Empowerment of Persons with Disabilities, Government of India, n.d.

[9] Punarbhava, "Demand grows for making sign language official and expanding certified interpreter workforce," Punarbhava Disability Portal, n.d.

[10] Journals of India, "MoU between ISLRTC and NCERT for conversion of educational materials into Indian Sign Language," Oct. 6, 2020. [Online]. Available: https://journalsofindia.com/2020/10/06/mou-between-ISLRTC-and-NCERT-for-conversion-of-educational-materials-into-indian-sign-language/

[11] Press Information Bureau, "Shri Dharmendra Pradhan launches PM eVIDYA DTH channel dedicated to Indian Sign Language," Ministry of Education, Government of India, Dec. 5, 2024. [Online]. Available: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1829308

[12] Info4Practice, "Deaf/hard of hearing students' experiences with higher education's real-time captioning services," June 24, 2024. [Online]. Available: https://www.info4practice.org/research_abstracts/deaf-hard-of-hearing-students-experiences-with-higher-educations-real-time-captioning-services/

[13] IAS Parliament, "Towards inclusive education: Analyzing draft accessibility guidelines," Mar. 17, 2022. [Online]. Available: https://iasparliament.com/towards-inclusive-education/

[14] Lok Sabha, Ministry of Human Resource Development, "Disability quota in universities," Unstarred Question No. 2349, Parliament of India, July 8, 2019. [Online]. Available: https://www.parliament.gov.in/loksabhaquestions/UnstarredQuestions/QuestionDetail.aspx?qid=246717

[15] K. Percival, M. Ahmed, and N. B. Khan, "Adjustment to learning environment by university students with deafness or hearing impairment," *S. Afr. J. Commun. Disord.*, vol. 72, no. 1, Art. a1114, 2025, doi: 10.4102/sajcd.v72i1.1114.

[16] World Federation of the Deaf (WFD) and World Association of Sign Language Interpreters (WASLI), "Statement on the use of signing avatars and automated translation tools," WFD-WASLI Joint Working Group, 2018.

[17] UNESCO, *Global Education Monitoring Report 2020: Inclusion and Education: All Means All*. United Nations Educational, Scientific and Cultural Organization, 2020. [Online]. Available: https://unesdoc.unesco.org/ark:/48223/pf0000373718

[18] *Rajive Raturi v. Union of India*, Writ Petition (Civil) No. 243 of 2005, Supreme Court of India, Nov. 8, 2024.