Inclusive Digital Communication in Higher Education: Information Accessibility for Low Vision Students in Bandung Raya

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ABSTRACT

Inclusive higher education in Indonesia still faces significant challenges in providing accessible digital communication for students with low vision. Learning Management Systems (LMS) are not only repositories of course content but also key mediated communication channels where lecturers, institutions, and students exchange information and feedback. When these platforms are inaccessible, the problem becomes communication inequality that restricts students' rights to receive and express information. This study explores accessibility barriers experienced by low vision students in universities across Bandung Raya, focusing on their interaction with LMS interfaces, messages, and media formats. Using a constructivist paradigm and an intrinsic case study approach, data were collected through semi-structured interviews and analyzed with Miles and Huberman's interactive model. Findings reveal three main communication-related accessibility issues: inconsistent visual layout and low-contrast interfaces, inadequate keyboard-based navigation, and the absence of screen reader integration and alternative formats such as audio or transcripts. Viewed through inclusive communication and the social model of disability, these barriers act as structural "noise" in mediated interaction. The study argues that LMS accessibility must be treated as a central component of inclusive digital communication, requiring user-informed design, assistive communication technologies, and participatory testing with low vision students as co-designers.

Keyword: *Inclusive Communication, Digital Communication, Information Accessibility, Low Vision, Learning Management Systems, Higher Education*

INTRODUCTION

The everyday realities of low-vision students in Indonesian higher education demonstrate that digital transformation has not automatically translated into inclusive communication. Across campuses, including those in the Greater Bandung area, Learning Management Systems (LMS) have become the primary channels for distributing materials, announcements, assignments, and facilitating academic interaction. However, low-vision-unfriendly interfaces, documents that are unreadable by screen readers, and the absence of alternative format options compel students with visual impairments to exert significantly more effort merely to hear the same messages as their peers. From a communication perspective, this situation is not merely a technical issue, but constitutes a systematic form of communicative exclusion.

This condition reinforces the phenomenon of invisible communication, in which low-vision students are physically present in classrooms and registered in academic systems, yet are nearly absent from the design of messages, interfaces, and campus digital communication policies. When their visual needs are not taken into account in the design of LMS platforms, course materials, and formal communication procedures, they are effectively positioned as second-class recipients of messages, depending on peers for informal translation assistance. Consequently, they are located within the education system, but remain at the margins of the communication ecosystem.

International studies indicate that visual disability is a relatively common category of disability among school pupils and university students, with substantial variation in prevalence across countries and educational levels (Bocconi, Dini, and Ott 2007a). Global reports also estimate that hundreds of millions of people live with visual impairments, including those of productive age who form an important segment of the student population (Saha 2018). These facts underscore that students with visual impairments are not anomalies, but a structural group that should logically be a primary consideration in the design of higher education communication(Bocconi et al. 2007a).

However, when the focus shifts to the Indonesian context, a critical issue emerges: the lack of detailed data on the number and distribution of low-vision students in higher education institutions. National statistics generally classify persons with visual disabilities into broad categories, without disaggregation by higher education level, field of study, or assistive technology use. At the institutional level, data collection on students with disabilities often stops at administrative needs, for example, at the point of admission, and is not integrated into the planning of institutional communication systems and digital learning media.

From the perspective of inclusive communication, invisibility in statistics has a direct implication for invisibility in communication. When low vision students are not clearly visible in data, they tend to be overlooked in the design of LMS interfaces, in guidelines for preparing course materials, and in institutional communication policies. This phenomenon illustrates how insensitive information management produces “symbolic absence” for certain groups, even though they are concretely present in classrooms and actively interact within the campus ecosystem.

Research on the participation of students with visual disabilities in higher education confirms the existence of layered barriers, ranging from heavy reading demands and inaccessible material formats to teaching practices that rely on visual elements without accompanying narration (Chien and Wu 2024). Limited access to digital materials, discussion forums, and other classroom activities reduces the opportunities for low vision students to voice their opinions, ask questions, negotiate, and participate as equal communication partners. Conversely, social support, assistive technologies, and pro-inclusive institutional policies have been shown to contribute to their retention and academic success (UNESCO 2011).

Within the framework of information accessibility, Swanson reminds us that accessibility is not merely a matter of information availability, but of the quality of systemic linkages that enable that information to be used effectively (Swanson 1992). Information that is formally available in the LMS but cannot be read by screen readers, lacks adequate contrast, or is presented as unlabelled images is, in essence, not truly accessible. This perspective aligns with the findings of Daugherty, Ellinger, and Rogers, who argue that organizational performance and responsiveness are strongly shaped by the degree to which their information systems are accessible to stakeholders(Rogers 1976).

The concept of inclusive digital communication develops from the idea that all individuals, regardless of background or ability, have the right to access, use, and benefit from information and communication technologies in meaningful ways(Anna Lawson 2017). Digital inclusion in this context does not stop at providing devices and connectivity, but also entails the capacity of digital systems to accommodate diverse ways of perceiving, processing, and expressing information(UNESCO 2011). For persons with visual disabilities, inclusive digital communication requires that interfaces, messages, and interaction features be accessible across multiple modalities, such as text, audio, and screen readers.

The visual dimension of inclusive digital communication becomes particularly crucial when messages are delivered through visually rich interfaces, graphics, and complex layouts. Research on LMS interfaces and e-learning tools shows that many platforms still fail to maintain readability and visual consistency when used with screen magnification or screen readers, thereby creating additional barriers for low vision users (Bocconi et al. 2007a; Pesudovs et al. 2024). Other studies highlight the importance of flexible display settings, such as font size, color contrast, and page structure, to prevent visual fatigue and frustration(Perkins School for the Blind 2023).

The Indonesian context is itself characterized by pronounced gaps in access. Various reports document divides between urban and rural regions, between islands, and among socio-economic groups in terms of telecommunication infrastructure, connection quality, and use of ICT (Dwikardana, S., Djelantik, S., Triwibowo, A., Valerisha, A., Martha, J., Pangestika, F. E., & Afira 2017). Equalization programs such as the Universal Service Obligation (USO) aim to extend internet access to underserved areas. However, their effectiveness depends heavily on governance quality, institutional coordination, and local community involvement.

From a socio-economic standpoint, income and educational levels significantly influence individuals' capacity to use ICT, including for higher education. Groups with greater resources tend to have better devices, connectivity, and digital literacy, while vulnerable groups are left behind in multiple ways (Anna Lawson 2017) At the same time, numerous studies critique the assumption that younger generations automatically possess high digital competence; being "digital natives" does not guarantee the ability to manage information critically and inclusively, particularly in contexts that require specific accessibility supports.

The regulatory and policy framework is also a decisive factor in the depth of the digital divide. The Convention on the Rights of Persons with Disabilities (CRPD) affirms the right to accessible information and communication as part of fundamental human rights , while analyses by the Council of Europe and Lawson emphasize that ICT accessibility is a legal and ethical obligation, not merely a technical preference. In Indonesia, the ratification of the CRPD and the issuance of disability-related regulations formally strengthen the mandate to provide equal access to education and technology. However, implementation remains partial and has not yet become a standard in LMS development (Anna Lawson 2017).

At the institutional level, many universities have adopted LMSs as the backbone of online learning but have not consistently integrated digital accessibility principles into their design and use policies. Studies on e-learning tools show that document structures, file formats, and modes of integrating materials often fail to meet the needs of users with visual impairments (Burzagli, Emiliani, and Graziani 2004). As a result, physical infrastructure does not always function as an equitable communication bridge for all students.

From a communication studies perspective, LMS should not be viewed merely as technical platforms, but as mediated communication spaces where messages are encoded by lecturers and institutions, transmitted through the system, and decoded by students. At this level, accessibility problems create various forms of noise, both technical and structural, which can distort or even sever the flow of messages. Disorganized layouts when zoomed, scanned PDFs that cannot be read by screen readers, or buttons that are not keyboard-accessible are examples of technical noise;. At the same time, the absence of explicit accessibility policies and lecturer training reflects deeper structural noise. International guidelines, such as the Web Content Accessibility Guidelines (WCAG) 2.1, provide conceptual principles to ensure that web content is perceivable, operable, understandable, and robust. The Council of Europe and G3ict highlight that these principles align with the need to guarantee message legibility, interaction control, interpretability, and the reliability of media channels. In the context of an LMS, implementing WCAG entails providing responsive interfaces, sufficient color contrast, keyboard-friendly navigation, and compatibility with screen readers, so that instructional messages can be accessed and responded to across multiple communication modalities.

Developments in assistive technologies and artificial intelligence offer new opportunities to strengthen inclusive digital communication in education. The integration of OCR and TTS has been shown to support blind and low vision users in accessing e-learning materials(Perkins School for the Blind 2023), while devices such as smart glasses with object detection and audio

feedback open possibilities for greater mobility and independence in learning environments (De Silva, Karunanayake, & Jayasundara, 2024). Other innovations, such as digital Braille systems and adaptive voice-based tools, also demonstrate substantial potential for inclusion (Pesudovs et al. 2024).

On the pedagogical side, the Universal Design for Learning (UDL) framework emphasizes the need to provide multiple means of representation, action, and engagement to accommodate diverse learning styles. UNESCO shows that integrating ICT in inclusive education requires not only the provision of devices, but also the reconfiguration of instructional communication strategies so that learning materials can be accessed through text, audio, visuals, and multimodal combinations. For low vision students, UDL and assistive technologies will only be effective if they are translated into consistent digital communication policies and practices, including in LMS design(UNESCO 2011).

From the standpoint of communication theory, the diffusion and adoption of accessibility features in LMS can be interpreted through the lens of Diffusion of Innovations. Digital accessibility can be seen as a socio-technical innovation whose relative advantage, compatibility with institutional values, complexity, trialability, and observability will influence the degree to which it is adopted by lecturers, system developers, and policy makers. Studies on accessibility and emerging ICT for users with disabilities indicate that institutional, cultural, and technical factors interact in complex ways to accelerate or hinder adoption (Radanliev et al., 2024).

Organizational culture, leadership styles, and decision-making structures within universities also shape the implementation of inclusive communication innovations. Daugherty et al. (1995) assert that responsive organizations are those whose information systems are easily accessible and open to user feedback. In this context, the development of an inclusive LMS cannot be separated from mechanisms for student consultation with disabilities, clear accessibility policies, and managerial commitment to treating accessibility as a performance indicator rather than an optional add-on when specific projects arise (Daugherty, Ellinger, and Rogers 1995). Placing the lived experiences of students with disabilities at the center of analysis is essential for understanding how inclusive (or non-inclusive) digital communication is actually experienced. Intrinsic case study approaches, using in-depth interviews and thematic analysis (Design 1989), enable researchers to map in detail how technical, policy, and cultural barriers intersect at the level of the everyday experiences of low vision users interacting with (ADCET 2022). Although the literature on digital accessibility and inclusive education continues to grow, most studies remain anchored in educational technology, human–computer interaction (HCI), or disability studies. Analyses that explicitly position LMS as an ecosystem of inclusive communication, linking issues of communication rights, message design, and power relations within digital campus infrastructures, are still relatively limited, particularly in Indonesia. This gap opens a significant space for contributions from communication studies.

By bringing together evidence on digital access gaps, the prevalence of visual disabilities, limited data on low-vision students, and the challenges of adopting accessibility innovations in higher education, the urgency of research on LMS information accessibility becomes increasingly clear. Without detailed data and an explicit communication perspective, low vision students will continue to occupy a position of “present yet unacknowledged” in the design of digital communication systems on campus. Research that examines the communication experiences of low vision students in using LMS, through the lenses of inclusive digital communication, information accessibility, and communication rights, thus becomes an important step toward disrupting this invisibility.

Accordingly, this study focuses on how low vision students in universities in the Greater Bandung area access, interpret, and respond to messages transmitted through LMS, and how the barriers they encounter can be understood as communication problems rather than merely technical limitations. By integrating perspectives on inclusive communication, universal design principles, and information accessibility, this research is expected to contribute to the development of digital communication models that are more equitable, participatory, and rights-based in Indonesian higher education.

RESEARCH METHODS

This study adopts a constructivist paradigm, which views social reality as a product of subjective interaction between the researcher and participants. Within this paradigm, knowledge is understood not as objective or absolute, but rather as individually constructed through personal interpretations of lived experience and social context (Lincoln and Guba, 1985; Creswell 2014). The constructivist approach was chosen because it aligns with the research aim: to explore the challenges and opportunities experienced by students with low vision in accessing digital learning systems, specifically Learning Management Systems (LMS), where user experience is shaped by perceptual and contextual interpretation.

The study employs an intrinsic case study approach as described by Creswell (2013), focusing on a specific phenomenon how low vision students navigate LMS environments in higher education. The case study is intrinsic in nature, as the goal is not to generalize findings but to achieve an in-depth understanding of social and technological realities within a bounded context (Creswell, 2013)

This is an exploratory qualitative study, appropriate for uncovering the dynamics, perceptions, and subjective experiences of participants in the context of digital education (Denzin and Lincoln 2011). The research involved five university students with diagnosed low vision from institutions in the Bandung Raya area. Participants were selected using purposive sampling with specific inclusion criteria: (1) currently enrolled in undergraduate or diploma programs (S1/D4), (2) formally diagnosed with low vision supported by medical or institutional documentation, and (3) a minimum of one semester's experience using an LMS for academic activities. A homogeneous purposive sampling strategy was applied to ensure a focused examination of shared experiences (Patton 2002).

Data were collected through semi-structured, in-depth interviews, guided by indicators derived from prior literature on digital accessibility (A Lawson 2017; Radanliev et al. 2024). Interview themes included first-time LMS experiences, technical and functional challenges, adaptation strategies, institutional support, and expectations for system improvement. Interviews were conducted remotely via Zoom and WhatsApp Voice Call to accommodate participants' accessibility preferences. Each session lasted between 45 and 60 minutes and was recorded with informed consent for transcription and analysis.

The data were analyzed using thematic analysis (Braun and Clarke 2006), following six steps: (1) data familiarization, (2) initial coding, (3) theme identification, (4) theme review, (5) theme definition and naming, and (6) narrative construction of results. The analysis was performed manually using text processing tools and coding spreadsheets. Data credibility was enhanced through member checking and peer debriefing to validate interpretations.

Ethical considerations were rigorously upheld, including informed consent, confidentiality of participant identities, and the right to withdraw from the study at any time. Through this methodological design, the study aims to provide a deep and contextually grounded understanding of how students with low vision experience, interpret, and adapt to digital learning systems, and how platforms such as LMS can be redesigned toward greater inclusivity based on real user experiences.

RESULT AND DISCUSSION

The findings of this study indicate that the experiences of low vision students using Learning Management Systems (LMS) in the Bandung Raya area are fundamentally a matter of communication, rather than merely a technical issue. The three clusters of barriers identified, visually inaccessible interface design, non-inclusive navigation structures, and the absence of essential accessibility features, directly affect students' ability to receive, interpret, and respond to instructional messages. Within an inclusive communication framework, LMS platforms fail to serve as communication channels that guarantee all students' right to equal access to information, and instead reproduce subtle yet systematic forms of communicative exclusion. The concrete accounts of students clarify how this exclusion operates at the micro-level of everyday academic life. Student F described having to "tilt the laptop and zoom up to 150%" just to read text, while R referred to the interface colour scheme as "grey on grey," making the text almost unreadable when their eyes were fatigued. These situations not only intensify cognitive and

physical load but also indicate that visual messages, which are meant to be the primary medium of learning, become "noise" that obscures content. From a communication perspective, the medium no longer supports the message; it obstructs it.

When LMS pages become disorganized upon zooming, as reported by students A and M, this reveals the system's failure to maintain the structural integrity of messages when accessed in different ways. This finding is consistent with Bocconi et al.'s observation that many e-learning platforms are not designed to remain stable under screen magnification or screen reader use, forcing low vision users to pay a high price to access the duplicate content as their peers. In the lens of inclusive communication, such design choices normalize one way of seeing the world, namely that of non-disabled users, while marginalizing other visual experiences. The navigation barriers students reported, such as buttons that cannot be accessed via keyboard tabbing or menus that disappear when the screen is zoomed in, indicate that LMS platforms do not yet meet basic accessibility requirements. Guidelines issued by bodies such as ADCET position keyboard operability as a baseline standard for digital inclusion, given that many users with visual or motor impairments rely on non-mouse input methods. When students report having to ask friends for help to submit assignments or open certain materials, we see how systemic design failures shift the function of instructional communication from formal channels to informal pathways that are not always accurate, thereby increasing dependency.

Reliance on scanned PDF formats that are not readable by screen readers further exacerbates the situation. Student M's complaint about files that cannot be accessed with NVDA or TalkBack exemplifies a concrete form of information obstruction: the content appears on the screen but is practically unusable. Burzagli et al. have long highlighted that inaccessible document formats constitute a significant barrier to e-learning, and the present findings demonstrate that these warnings remain highly relevant. In Swanson's terms, information that "exists" but cannot be accessed cannot be regarded as genuinely available.

A lack of educator understanding of inclusive design principles compounds these technical barriers. Students reported experiences of graphs uploaded without accompanying descriptions, slides full of colour with no textual explanation, and key information presented only briefly in synchronous sessions without being translated into accessible formats in the LMS. This confirms UNESCO's and various accessibility guidelines' emphasis that training educators to provide verbal alternatives and inclusive formats is a prerequisite for inclusive instructional communication, rather than a mere pedagogical value-added.

From an inclusive communication perspective, the students' assertion that "accessibility is a right, not a special service" carries deep normative significance. This statement echoes the spirit of the Convention on the Rights of Persons with Disabilities, which frames access to information and communication as integral to full participation in education. When students report having to "guess the content" or "depend on friends" to understand assignments, what is at stake is not merely technical inconvenience but a violation of their communication rights as academic citizens. Placed within a broader landscape, these findings resonate with global data showing that visual disability is a significant issue at the population level. Global estimates indicate that hundreds of millions of people live with visual impairment, with prevalence projected to rise as populations age and lifestyles change (Resnikoff, Pascolini, and Etya'ale 2024); Pascolini and Marrioti 2012; Bourne, Flaxman, and Braithwaite 2017). Many of these individuals are of working and studying age, including university students. Failure to incorporate their perspectives into the design of digital communication in higher education amounts to effectively ignoring a significant demographic reality. Research on disabled students' experiences in higher education across various countries shows similar patterns: physical, social, and digital barriers force them to follow a "different and more demanding path" to achieve the same academic goals as their peers (Holloway 2001;Fuller, Bradly, and Healey 2004). The present study confirms this pattern in the Indonesian context, but with particularities related to digital infrastructure, institutional policy, and campus communication culture, which have not yet made accessibility a normative expectation.

The concept of inclusive digital communication helps sharpen the reading of these findings. Inclusive digital communication does not simply concern providing technical access, but ensuring that all users can meaningfully access, understand, and respond to messages

through modalities that align with their needs (Council of Europe 2017; A Lawson 2017). Within this framework, the presence of non-scalable text, low-contrast colour schemes, and documents that are not readable by screen readers indicates that the LMS platforms used by students do not yet meet fundamental principles of inclusive digital communication. The literature on digital inclusion emphasises that inclusion encompasses interrelated dimensions of infrastructure, skills, and social participation (Caruso 2014; Becker et al. 2014;Lopez and Castaneda 2015). For low vision students, the main problem is not "internet connectivity" or "device ownership", but rather the quality of interface and message formats, which determine whether they can genuinely participate in academic communication. In other words, the digital divide here has evolved into a divide in usage and meaning - making, as identified in broader studies of differential media use (van Deursen and van Dijk 2014).

As a mediated communication channel, LMS platforms constitute spaces where communicative power relations are organised and negotiated. Lecturers and institutions act as senders who determine the format, structure, and pace of message distribution. At the same time, low vision students occupy the position of receivers whose decoding capacities are heavily conditioned by system design. When the system does not accommodate diverse access preferences and user profiles, students with visual disabilities are positioned as passive recipients who must adjust to the visual norms of the majority. From the perspective of the production of space, LMS platforms can be seen as a form of social space produced through technical decisions, policies, and everyday practices (Lefebvre 2014). The findings of this study show that this digital space is currently produced under the assumption of full visual capacity, leaving the bodies and sensory experiences of low-vision users unrepresented in its design logic. Consequently, low vision students experience what can be called "symbolic dislocation": they are part of the academic community, but their sensory identities have no recognised place in the structure of the digital space they inhabit.

Diffusion of Innovations (DOI) theory offers an additional framework for understanding why accessibility features have not become central to LMS design, despite the availability of guidelines and supporting technologies. From a DOI perspective, digital accessibility can be conceptualised as a socio-technical innovation whose spread is shaped by innovation attributes, communication channels, temporal dynamics, and the structure of the social system. The key question becomes: why has this innovation not been widely adopted within the universities studied?. One core assumption of DOI is that innovations perceived as offering relative advantage, being compatible with users' values and needs, manageable in complexity, trialable, and observable in their benefits will be adopted more quickly. If LMS accessibility is treated as an innovation, the present findings suggest that its relative advantage has not yet been internalised at the institutional level. For low vision students, the benefits are evident: more equitable communicative access, greater autonomy, and reduced dependence on informal support. However, for some system administrators and lecturers, accessibility is still perceived as an extra burden or a "minority demand" rather than as an enhancement of overall institutional communication quality.

In terms of compatibility, digital accessibility should, in principle, align strongly with higher education values of human rights, inclusion, and equity. Nevertheless, the findings indicate a gap between the values articulated in documents such as inclusion policies and the CRPD, and the actual practices embedded in LMS design and use. This suggests that compatibility is not determined solely by abstract values but also by organisational culture, work routines, and budgeting priorities that shape decision-making contexts. Complexity is also a barrier to adoption. Lecturers and developers may perceive implementing WCAG principles, providing text alternatives, and testing screen reader compatibility as complicated and time-consuming. Students implicitly capture this perception when they recount experiences of lecturers who "upload colourful slides without explanation" or administrators who do not respond to complaints about interface issues. Nevertheless, literature on socially inclusive design and e-inclusion indicates that complexity can be managed through clear guidelines, training, and systematic technical support (Pellerin 2013); Tim et al. 2025; Ionescu and Moraru 2023).

The dimensions of trialability and observability within DOI are also relevant. Accessibility features are rarely piloted in small-scale trials with disabled users before full implementation, leaving institutions without direct evidence of their effectiveness and benefits. Students in this study expressed a strong desire to be involved as co-designers and testers, but such opportunities have not been systematically offered. As a result, the potential positive outcomes of accessibility measures remain invisible primarily to decision-makers, slowing the diffusion cycle.

The adopter categories identified in DOI, innovators, early adopters, early majority, late majority, and laggards, can help map the roles of actors in the campus ecosystem. In this context, low vision students, a handful of concerned lecturers, and small units experimenting with more accessible materials may be seen as "innovators" or "early adopters" of inclusive communication practices. However, without structural support from university management and formal policy frameworks, their efforts remain fragmented and cannot progress to the early majority stage, where accessibility becomes a normalised practice.

The communication channels through which ideas about accessibility are disseminated also determine the speed and quality of innovation diffusion. When information about the importance of accessibility circulates only through occasional workshops or individual lecturer initiatives, its reach is limited. By contrast, when accessibility is embedded in formal policies, continuous professional development, and LMS evaluation mechanisms, it stands a much better chance of permeating organisational layers. Students' reports that they must re-explain the same needs to different lecturers suggest that internal communication about accessibility is not yet systematically organised.

Inclusive communication principles require that the diffusion of accessibility innovations not only target decision-makers but also open space for the voices of those most affected. The literature on inclusive digital innovation and digital leadership emphasises the need for leadership that centres inclusion in digital transformation, rather than treating it as an afterthought (Hamburg and Lütgen 2020;Martens, Schaper, and Kamin 2024). In this study, the absence of explicit accessibility policies and the lack of student references to leadership roles in this issue may be read as indicators that inclusive digital leadership has not yet been strongly articulated. The experiences of low vision students in this research can also be interpreted as a concrete example of a new generation of digital divide, differences in the ways and quality with which technologies are used, rather than mere physical access. They are present on the same networks as their peers and use the same LMS, yet encounter significantly higher barriers in understanding and responding to messages. This corresponds with analyses suggesting that the digital divide has shifted from access to differences in use and outcomes (van Deursen and van Dijk 2014; Hamburg and Lütgen 2020).

Research on digital inclusion points out that digital communities and social media spaces can be key arenas for building solidarity and driving change (Caruso 2014;Rocha Lourenco, Oliveira, and Timoshchuk 2025;Carvalho 2025; Kuzmina and Khlebnikov 2025). For low vision students, this potential might be realised through online communities that advocate for accessibility, exchange adaptation strategies, and push for policy change at the institutional level. However, the current study does not yet reveal the presence of such digitally organised student communities in the observed context, indicating that students' voices remain scattered across individual experiences. Questions of language and digital rights are also inseparable from an inclusive communication analysis. Discussions on language and digital rights emphasise that the ability to express oneself, manage one's identity, and participate responsibly in digital spaces is part of broader communication rights (Sari et al. 2025). When low vision students are not provided with tools and environments that support equitable access to and production of messages, these rights are reduced to mere formalities rather than lived practices.

A significant strength of the qualitative approach in this study lies in its capacity to capture the nuances of emotion, frustration, and hope in students' accounts of LMS use. Through thematic analysis, recurring experience patterns, such as visual fatigue, navigational confusion, and reliance on peer assistance, can be articulated as major themes that illustrate how communicative exclusion manifests in practice. This approach is consistent with methodological guidance on thematic analysis, which stresses moving from descriptive coding towards deeper

conceptual interpretation (Braun and Clarke 2006). The finding that students value being involved as LMS co-designers provides empirical support for participatory design theory. Participatory design positions users, particularly those in marginalised positions as indispensable knowledge holders in shaping genuinely responsive systems (Bocconi, Dini, and Ott 2007; Tim et al. 2025). In DOI terms, involving users as co-designers may also strengthen innovation diffusion processes by giving them roles as opinion leaders who mediate between everyday user experience and the technical world of developers.

From a policy standpoint, this research suggests that readiness assessments for ICT accessibility, such as tools for evaluating institutional e-readiness, should be integral to higher education digital transformation strategies (Othman et al. 2023). Without systematic evaluation mechanisms, institutions risk making rhetorical claims of inclusivity while their practices and infrastructures continue to reproduce exclusionary patterns. In this study, low-vision students themselves serve as living sensors that reveal mismatches between institutional claims and lived realities. Students' references to heavy reading loads and limited participation align with findings from other countries on the barriers faced by disabled students in higher education (Holloway 2001;Fuller, Bradly, and Healey 2004; Abreh, 2025). However, this research adds a new dimension by positioning the LMS as the primary arena in which these barriers are digitally configured. This suggests that inclusive efforts in higher education cannot focus solely on adaptations in physical classrooms; they must equally address the redesign of digital learning spaces.

In the context of online classes, guidelines on digital well-being emphasize that synchronous and asynchronous learning environments should be designed with accessibility, multimodality, and sociocultural sensitivity in mind (Heiser et al., 2025). The experiences of low vision students who do not receive audio or textual alternatives for visual content illustrate that these principles are far from normative. Here, failures of inclusive communication affect not only information access but also students' sense of belonging and digital well-being. From a DOI perspective, it can be argued that LMS accessibility innovations in the studied context are still in an early phase, with some individuals and units serving as pioneers but not yet reaching the critical mass needed for broader change. This situation is exacerbated by the absence of communication strategies that explicitly frame accessibility as a high-value innovation for the entire academic community, rather than a niche concern. Without narratives that highlight how accessibility enhances communicative quality and institutional reputation, such innovations are easily perceived as burdens rather than investments.

Theoretically, the findings extend both inclusive communication and DOI frameworks by demonstrating that adopting accessibility innovations in LMSs cannot be understood merely as a technical or cost–benefit rationality issue. It is also deeply intertwined with structures of power, symbolic hierarchies regarding who counts as the primary user, and the extent to which the communication rights of disabled groups are recognised as part of the institutional mandate. In this sense, DOI must be read alongside the social model of disability and communication rights theory to adequately capture the complexity of innovation adoption processes linked to social justice. This study reaffirms the view that digital inclusion is not merely a technical project but a social process requiring change at multiple levels: system design, organisational communication patterns, and the culture of interaction between lecturers and students (Lopez and Castaneda 2015; Hamburg and Lütgen 2020; Ionescu and Moraru 2023). The students' expressed desire for lecturer training and strong accessibility policies indicates that they understand inclusion as a collective effort, not an individual responsibility to adapt to an unfriendly system.

Accordingly, the primary contribution of this research lies in its ability to link the micro-level experiences of low-vision students with macro-level policy structures, inclusive communication theory, and diffusion-of-innovation frameworks. It shows that the barriers faced by students are not inevitable consequences of their visual conditions, but rather products of design decisions, institutional priorities, and patterns of innovation diffusion that do not yet favour accessibility. In this context, LMS platforms are not neutral tools but arenas where inclusive or exclusive communication is produced and reproduced daily.

The practical implication is that LMS developers, university leaders, and policymakers must view accessibility as a strategic communication innovation rather than a minimal

regulatory compliance issue. By integrating inclusive communication principles with innovation diffusion strategies sensitive to user diversity, institutions can accelerate the adoption of accessibility features and ensure that digital transformation genuinely becomes a transformation toward more just communication. Without such steps, low vision students will remain in a position of being present yet unrecognised within higher education communication ecosystems.

Finally, this research opens avenues for future studies to test the effectiveness of specific accessibility interventions, map the roles of key actors in innovation diffusion processes, and develop more contextually grounded conceptual models of inclusive digital communication for Indonesia. By combining the lenses of inclusive communication and DOI, subsequent work can help formulate strategies that not only build more accessible technologies but also reconfigure campus communication ecosystems to become more participatory, responsive, and equitable for all members, including those who experience and see the world differently.

CONCLUSION

This study concludes that the barriers experienced by low vision students in using LMS platforms across Bandung Raya are fundamentally communicative in nature, rather than merely technical. Visually inaccessible interface design, non-inclusive navigation structures, and the absence of essential accessibility features directly constrain students' capacity to receive, interpret, and respond to instructional messages. As a result, the LMS fails to function as an institutional communication channel that guarantees equal informational access, and instead reproduces subtle yet systematic forms of communicative exclusion in everyday academic life. These conditions increase cognitive and physical load, while also displacing formal instructional communication into informal, peer-dependent pathways that are not always reliable and may further intensify students' dependency.

From a theoretical standpoint, the findings strengthen the notion of inclusive digital communication by demonstrating that "access" cannot be reduced to platform availability or connectivity, but must be assessed in terms of whether users can meaningfully engage with messages through formats, structures, and modalities aligned with diverse needs. The LMS emerges as a mediated space where communicative power relations are organized: lecturers and institutions shape message formats, pace, and structures, while low vision students are positioned as receivers required to adapt to dominant visual norms. Read through Diffusion of Innovations theory, accessibility appears not yet institutionalized as a high-value socio-technical innovation; its relative advantage is insufficiently recognized at the organizational level, perceived complexity remains high, and opportunities for trialability and observability are limited due to the lack of systematic piloting with disabled users and weak internal communication channels that would normalize accessibility as standard practice.

Practically, the study implies that LMS accessibility should be treated as a strategic communication innovation grounded in rights-based inclusion, rather than a minimal compliance task. Universities should embed accessibility evaluation into digital transformation agendas, articulate inclusive digital leadership, and provide sustained professional development for educators on accessible message production (e.g., text alternatives, verbal descriptions of visual content, screen-reader–friendly document formats). Equally important is the systematic involvement of low vision students as co-designers and testers to ensure that design logics represent diverse sensory experiences and to accelerate diffusion through more visible, demonstrable benefits. Future research should therefore test the effectiveness of specific accessibility interventions, map key actors and communication channels in diffusion processes, and develop context-sensitive models of inclusive digital communication for Indonesia, so that digital learning environments become genuinely participatory and equitable for all academic citizens.

REFERENCES

ADCET. 2022. "Inclusive Teaching: Blind and Vision Impaired."

Becker, S., C. Coward, M. Creandall, and A. Ball. 2014. "Building Digital Communities: A Framework for Action."

Bocconi, S., S. Dini, and M. Ott. 2007a. "ICT Educational Tools and Visually Impaired Students: Different Answers to Different Accessibility Needs." in *Computers Helping People with Special Needs. ICCHP 2006. Lecture Notes in Computer Science*. Vol. 4061. Springer.

Bocconi, S., S. Dini, and M. Ott. 2007b. "ICT Educational Tools and Visually Impaired Students: Different Answers to Different Accessibility Needs."

Bourne, R. R., S. R. Flaxman, and T. Braithwaite. 2017. "Magnitude, Temporal Trends, and Projections of the Global Prevalence of Blindness and Distance and near Vision Impairment: A Systematic Review and Meta-Analysis."

Braun, V., and V. Clarke. 2006. "Using Thematic Analysis in Psychology. Qualitative Research in Psychology."

Burzagli, L., P. L. Emiliani, and P. Graziani. 2004. "Usability and Accessibility of E-Learning Tools." *International Journal of Human-Computer Interaction* 17(2):209–25. doi:10.1207/s15327590ijhc1702_5.

Caruso, S. 2014. "Creating Digital Communities: A Resource to Digital Inclusion."

Carvalho, I. C. 2025. "Digital Media and Feminist Activism: Reclaiming Inclusive Urban Spaces in the Post-Digital Era. Cidades."

Chien, Hui-Jiuan, and Yi-Shan Wu. 2024. "Accessible Formats That Support Access to Information by Persons with Disabilities." *Journal of the Formosan Medical Association* 123(1):305–6. doi:10.1016/j.jfma.2023.11.001.

Council of Europe. 2017. "Accessibility of Information, Technologies and Communication for Persons with Disabilities: Contribution to the Council of Europe Strategy on the Rights of Persons with Disabilities."

Creswell, John W. 2014. "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches."

Creswell, John W. n.d. *Qualitative Inquiry and Research Design: Choosing among Five Approaches*. SAGE Publications.

Daugherty, Patricia J., Alexander E. Ellinger, and Dale S. Rogers. 1995. "Information Accessibility: Customer Responsiveness and Enhanced Performance." *International Journal of Physical Distribution & Logistics Management* 25(1):4–17. doi:10.1108/09600039510080117.

Denzin, N. K., and Y. S. Lincoln. 2011. "Online or Face-to-Face Microbiology Laboratory Sessions? First Year Higher Education Student Perspectives and Preferences."

Design, Qualitative Inquiryresearch. 1989. "STUDI KASUS (John W . Creswell) Oleh Yani Kusmarni." 1–12.

van Deursen, A. J., and J. A. G. M. van Dijk. 2014. *The Digital Divide Shifts to Differences in Usage*.

Dwikardana, S., Djelantik, S., Triwibowo, A., Valerisha, A., Martha, J., Pangestika, F. E., & Afira, M. 2017. "Transformasi Strategi Diplomasi Di Era Digital: Identifikasi Postur Diplomasi Digital Di Indonesia." *Penelitian Hibah Monodisiplin* (2014330012):1–99.

Fuller, M., A. Bradly, and M. Healey. 2004. "Incorporating Disabled Students within an Inclusive Higher Education Environment."

Hamburg, I., and G. Lütgen. 2020. "Digital Divide, Inclusive Digital Innovation and Education."

Holloway, S. 2001. "The Experience of Higher Education from the Perspective of Disabled Students. Disability & Society."

Ionescu, D., and L. N. Moraru. 2023. "Inclusive Education and Digital Education. ELearning and Software for Education Conference."

Kuzmina, A. M., and N. S. Khlebnikov. 2025. "Visual Inclusive Communication of Socially-Oriented Nonprofit Organizations on Social Media."

Lawson, A. 2017. "Final Study: Accessibility of Information, Technologies and Communication for Persons with Disabilities."

Lawson, Anna. 2017. "Final Study: Accessibility of Information, Technologies and Communication for Persons with Disabilities."

Lefebvre, H. 2014. "The Production of Space. Oxford: Blackwell."

Lopez, J. J. S., and L. A. R. Castaneda. 2015. "Digital Inclusion and Social Perspective – Critical Discussion Based on a Systematic Review of the Literature."

Martens, C., F. Schaper, and A. M. Kamin. 2024. "ICT for Inclusion" for Educational Leaders: Inclusive and Digital Distributed Leadership."

Othman, A., A. Almutawaa, A. Al Tamimi, and Al Mansouri M. 2023. "Assessing the Readiness of Government and Semi-Government Institutions in Qatar for Inclusive and Sustainable ICT Accessibility: Introducing the MARSAD Tool."

Pascolini, D., and S. P. Marrioti. 2012. "Global Estimates of Visual Impairment: 2010."

Patton, M. Q. 2002. "Qualitative Research and Evaluation Methods."

Perkins School for the Blind. 2023. "Classroom Technology That Benefits Low Vision Students."

Pesudovs, Konrad, Van Charles Lansingh, John H. Kempen, Ian Tapply, Arthur G. Fernandes, Maria Vittoria Cicinelli, Alessandro Arrigo, Nicolas Leveziel, Serge Resnikoff, Hugh R. Taylor, Tabassom Sedighi, Seth Flaxman, Mukkharram M. Bikbov, Tasanee Braithwaite, Alain Bron, Ching Yu Cheng, Monte A. Del Monte, Joshua R. Ehrlich, Leon B. Ellwein, David Friedman, João M. Furtado, Gus Gazzard, Ronnie George, M. Elizabeth Hartnett, Jost B. Jonas, Rim Kahloun, Moncef Khairallah, Rohit C. Khanna, Janet Leasher, Julie Anne Little, Vinay Nangia, Michal Nowak, Tunde Peto, Pradeep Ramulu, Fotis Topouzis, Mitiadis Tsilimbaris, Ya Xing Wang, Ningli Wang, Rupert Bourne, Konrad Pesudovs, Van Charles Lansingh, John H. Kempen, Ian Tapply, Arthur G. Fernandes, Maria Vittoria Cicinelli, Alessandro Arrigo, Nicolas Leveziel, Paul Svitil Briant, Theo Vos, Seth Flaxman, Yohannes Habtegiorgis Abate, Mohammad Abdollahi, Mozhan Abdollahi, Ayele Mamo Abebe, Olumide Abiodun, Richard Gyan Aboagye, Woldu Aberhe Abrha, Hasan Abualruz, Hiwa Abubaker Ali, Eman Abu-Gharbieh, Salahdein Aburuz, Tadele Girum Girum Adal, Mesafint Molla Adane, Isaac Yeboah Addo, Qorinah Estiningtyas Sakilah Adnani, Muhammad Sohail Afzal, Shahin Aghamiri, Bright Opoku Ahinkorah, Aqeel Ahmad, Sajjad Ahmad, Ali Ahmadi, Ayman Ahmed, Haroon Ahmed, Ahmad Samir Alfaar, Abid Ali, Syed Shujait Shujait Ali, Awais Altaf, Hubert Amu, Sofia Androudi, Rodrigo Anguita, Abhishek Anil, Saeid Anvari, Anayochukwu Edward Anyasodor, Francis Appiah, Jalal Arabloo, Mosab Arafat, Damelash Areda, Reza Arefnezhad, Brhane Berhe Aregawi, Akeza Awealom Asgedom, Tahira Ashraf, Seyyed Shamsadin Athari, Bantalem Tilaye Tilaye Atinafu, Maha Moh'd Wahbi Atout, Alok Atreya, Haleh Ayatollahi, Ahmed Y. Azzam, Hassan Babamohamadi, Sara Bagherieh, Yogesh Bahurupi, Atif Amin Baig, Biswajit Banik, Mainak Bardhan, Saurav Basu, Kavita Batra, Nebiyou Simegnew Bayileyegn, Fatemeh Bazvand, Addisu Shunu Beyene, Devidas S. Bhagat, Akshaya Srikanth Bhagavathula, Pankaj Bhardwaj, Sonu Bhaskar, Jasvinder Singh Bhatti, Niloufar Bineshfar, Marina G. Birck, Veera R. Bitra, Tasanee Braithwaite, Katrin Burkart, Yasser Bustanji, Zahid A. Butt, Florentino Luciano Caetano dos Santos, Luis Alberto Cámera, Vera L. A. Carneiro, Muthia Cenderadewi, Eeshwar K. Chandrasekar, Vijay Kumar Chattu, Nitin Chitranshi, Hitesh Chopra, Dinh Toi Chu, Kaleb Coberly, João M. Coelho, Natália Cruz-Martins, Omid Dadras, Xiaochen Dai, Subasish Das, Ana Maria Dascalu, Mohsen Dashti, Maedeh Dastmardi, Berecha Hundessa Demessa, Biniyam Demisse, Diriba Dereje, Awoke Masrie Asrat Derese, Nikolaos Dervenis, Vinoth Gnana Chellaiyan Devanbu, Thanh Chi Do, Thao Huynh Phuong Do, Francisco Winter dos Santos Figueiredo, Arkadiusz Marian Dziedzic, Hisham Atan Edinur, Ferry Efendi, Joshua R. Ehrlich, Michael Ekholuenetale, Temitope Cyrus Ekundayo, Iman El Sayed, Muhammed Elhadi, Mohammad Hassan Emamian, Mehdi Emamverdi, Azin Etemadimanesh, Adeniyi Francis Fagbamigbe, Ayesha Fahim, Hossein Farrokhpour, Ali Fatehizadeh, Alireza Feizkhah, Lorenzo Ferro Desideri, Getahun Fetensa, Florian Fischer, Ali Forouhari, Matteo Foschi, Kayode Raphael Fowobaje, Abhay Motiramji Gaidhane, Aravind P. Gandhi, Miglas W. W. Gebregergis, Mesfin Gebrehiwot, Brhane Gebremariam, Urge Gerema, Fariba Ghassemi, Sherief Ghozy, Mahaveer Golechha, Pouya Goleij, Bárbara Niegia Garcia Goulart, Shi Yang Guan, Zewdie Gudisa, Sapna Gupta, Veer Bala Gupta, Vivek Kumar Gupta, Arvin Haj-Mirzaian, Aram Halimi, Shahin Hallaj, Samer Hamidi, Mehdi Harorani, Hamidreza Hasani, Demisu Zenbaba Heyi, Nguyen Quoc Hoan, Ramesh Holla, Sung Hwi Hong, Mehdi Hosseinzadeh, Chengxi Hu, John J. Huang, Hong Han Huynh, Segun Emmanuel Ibitoye, Irena M. Ilic, Mustapha Immurana, Md Rabiul Islam, Sheikh Mohammed Shariful Islam, Chidozie C. D. Iwu, Louis Jacob, Ammar Abdulrahman Jairoun, Manthan Dilipkumar Janodia, Shubha Jayaram, Har Ashish Jindal, Mohammad Jokar, Nitin Joseph, Charity Ehimwenma Joshua, Vidya Kadashetti, Laleh R. Kalankesh, Rohollah Kalhor, Sagarika Kamath, Himal Kandel, Rami S. Kantar, Ibraheem M. Karaye, Hengameh Kasraei, Soujanya Kaup, Navjot Kaur, Rimple Jeet Kaur, Gbenga A. Kayode, Yousef Saleh Khader,

Himanshu Khajuria, Rovshan Khalilov, Mahalaqua Nazli Khatib, Adnan Kisa, Soewarta Kosen, Ai Koyanagi, Kewal Krishan, Mukhtar Kulimbet, Nithin Kumar, Om P. Kurmi, Chandrakant Lahariya, Tuo Lan, Iván Landires, Munjae Lee, Seung Won Lee, Wei Chen Lee, Stephen S. Lim, Julie Anne Little, Preetam Bhalchandra Mahajan, Sandeep B. Maharaj, Alireza Mahmoudi, Razzagh Mahmoudi, Kashish Malhotra, Tauqeer Hussain Mallhi, Vahid Mansouri, Emmanuel Manu, Roy Rillera Marzo, Andrea Maugeri, Colm McAlinden, Wondwosen Mebratu, Tesfahun Mekene Meto, Yang Meng, Abera M. Mersha, Tomislav Mestrovic, Le Huu Nhat Minh, Awoke Misganaw, Manish Mishra, Sanjeev Misra, Nouh Saad Mohamed, Soheil Mohammadi, Mustapha Mohammed, Hoda Mojiri-forushani, Ali H. Mokdad, Hossein Molavi Vardanjani, Mohammad Ali Moni, Fateme Montazeri, Maryam Moradi, Rohith Motappa, Parsa Mousavi, Admir Mulita, Christopher J. L. Murray, Ganesh R. Naik, Gurudatta Naik, Shumaila Nargus, Zuhair S. Natto, Biswa Prakash Nayak, Mohammad Negaresh, Hadush Negash, Dang H. Nguyen, Phat Tuan Nguyen, Van Thanh Nguyen, Robina Khan Niazi, Osaretin Christabel Okonji, Andrew T. Olagunju, Matthew Idowu Olatubi, Michal Ordak, Uchechukwu Levi Osuagwu, Nikita Otstavnov, Mayowa O. Owolabi, Jagadish Rao Padubidri, Ashok Pandey, Georgios D. Panos, Shahina Pardhan, Seoyeon Park, Jay Patel, Shrikant Pawar, Prince Peprah, Ionela Roxana Petcu, Alireza Peyman, Hoang Tran Pham, Mohsen Pourazizi, Nguyen Khoi Quan, Fakher Rahim, Vafa Rahimi-Movaghar, Mohammad Hifz Ur Rahman, Sathish Rajaa, Shakthi Kumaran Ramasamy, Premkumar Ramasubramani, Shubham Ranjan, Mohammad Mahdi Rashidi, Rama Shankar Rath, Annisa Utami Rauf, Salman Rawaf, Amirmasoud Rayati Damavandi, Elrashdy Moustafa Mohamed Redwan, Priyanka Roy, Koushik Roy Pramanik, Zahra Saadatian, Siamak Sabour, Basema Saddik, Umar Saeed, Sare Safi, Sher Zaman Safi, Amene Saghazadeh, Fatemeh Saheb Sharif-Askari, Amirhossein Sahebkar, Mohammad Ali Sahraian, Joseph W. Sakshaug, Mohamed A. Saleh, Sara Samadzadeh, Yoseph Leonardo Samodra, Vijaya Paul Samuel, Abdallah M. Samy, Aswini Saravanan, Siddharthan Selvaraj, Farbod Semnani, Sabyasachi Senapati, Yashendra Sethi, Seyed Arsalan Seyedi, Allen Seylani, Amira A. Shaheen, Samiah Shahid, Moyad Jamal Shahwan, Masood Ali Shaikh, Sunder Sham, Muhammad Aaqib Shamim, Mohammed Shannawaz, Bereket Beyene Shashamo, Maryam Shayan, Aminu Shittu, Ivy Shiue, K. M. Shivakumar, Seyed Afshin Shorofi, Migbar Mekonnen Sibhat, Emmanuel Edwar Siddig, Juan Carlos Silva, Jasvinder A. Singh, Paramdeep Singh, Eirini Skiadaresi, Yonatan Solomon, Raúl A. R. C. Sousa, Chandrashekhar T. Sreeramareddy, Vladimir I. Starodubov, Mohana Devi Subramaniam, Sri Susanty, Seyyed Mohammad Tabatabaei, Birhan Tsegaw Taye, Gebrehiwot Teklay, Mohamad Hani Temsah, Dufera Rikitu Terefa, Jansje Henny Vera Ticoalu, Temesgen Mohammed Toma, Aristidis Tsatsakis, Guesh Mebrahtom Tsegay, Munkhtuya Tumurkhuu, Biruk Shalmeno Tusa, Sree Sudha Ty, Chukwudi S. Ubah, Muhammad Umair, Tungki Pratama Umar, Rohollah Valizadeh, Jef Van den Eynde, Stephanie Louise Watson Watson, Tewodros Eshete Wonde, Guadie Sharew Wondimagegn, Hong Xiao, Yao Yao, Iman Yazdani Nia, Arzu Yiğit, Yazachew Yismaw, Dong Keon Yon, Naohiro Yonemoto, Yuyi You, Chuanhua Yu, Mikhail Sergeevich Zastrozhin, Hanqing Zhao, Makan Ziafati, Magdalena Zielińska, Yossef Teshome Zikarg, Mohammad Zoladl, and Jaimie D. Steinmetz. 2024. "Global Estimates on the Number of People Blind or Visually Impaired by Cataract: A Meta-Analysis from 2000 to 2020." *Eye (Basingstoke)* 38(11):2156–72. doi:10.1038/s41433-024-02961-1.

Pllerin, M. 2013. "E-Inclusion in Early French Immersion Classrooms: Using Digital Technologies to Support Inclusive Practices That Meet the Needs of All Learners."

Radanliev, P, D. De Roure, P. Novitzky, and I. Sluganovic. 2024. "Accessibility and Inclusiveness of New Information and Communication Technologies for Disabled Users and Content Creators in the Metaverse."

Radanliev, Petar, David De Roure, Peter Novitzky, and Igor Sluganovic. 2024. "Accessibility and Inclusiveness of New Information and Communication Technologies for Disabled Users and Content Creators in the Metaverse." *Disability and Rehabilitation: Assistive Technology* 19(5):1849–63. doi:10.1080/17483107.2023.2241882.

Resnikoff, S. R., D. Pascolini, and D. E. Etya'ale. 2024. "Global Data on Visual Impairment in the Year 2002."

Rocha Lourenco, F., R. Oliveira, and O. Timoshchuk. 2025. “Social Media as a Tool for Promoting Inclusion: An Analysis of the Facebook and Instagram Pages of Inclusive Spaces.”

Rogers, Everett M. 1976. “Communication and Development: The Passing of the Dominant Paradigm.” *Communication Research* 3(2):213–40. doi:10.1177/009365027600300207.

Saha, P. 2018. “Assistive Technologies for the Visually Impaired.”

Sari, H., A. N. A. Nurhayati, S. Sulaeman, and A. Asrifan. 2025. “Language and Digital Rights: Fostering Communication Skills for Responsible Online Engagement.”

Swanson, E. B. 1992. “Information Accessibility Reconsidered.” *Accounting, Management and Information Technologies* 2(3):183–96. doi:10.1016/0959-8022(92)90015-K.

Tim, Y., J. Brooks, D. Zeng, and J. Huynh. 2025. “Towards Socially Inclusive Design: An Action Design Research Project Supporting Social Inclusion of Senior Citizens.”

UNESCO. 2011. “ICTs in Education for People with Disabilities: Review of Innovative Practices.”