

Inclusive Digital Technology and Islamic Education: Promoting Social Equity for Persons with Disabilities in the Digital Age

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ABSTRACT

Persons with disabilities continue to face significant barriers in accessing digital technologies, particularly within educational contexts. The lack of inclusive design and limited digital literacy have contributed to a growing accessibility gap, reducing their ability to fully participate in social, economic, and religious life. This study aims to examine the role of inclusive digital technology in promoting social equity for persons with disabilities and its alignment with the values of Islamic education. A descriptive qualitative approach was employed using library research methods. Data were collected from a range of secondary sources, including international journals, national academic publications, NGO reports, and classical and contemporary Islamic literature. The findings reveal that technologies such as screen readers, voice recognition systems, and virtual assistants significantly enhance digital accessibility and independence for individuals with disabilities. The application of Universal Design for Learning (UDL) principles also proves effective in creating inclusive online educational environments. From an Islamic ethical perspective, digital inclusion is consistent with the objectives of *maqāṣid al-sharī'ah*, particularly in preserving religion, intellect, and life. The study implies that collaborative efforts between Islamic educational institutions, technology developers, and policymakers are essential to embed the principles of justice and inclusivity in sustainable digital transformation.

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INTRODUCTION

According to the World Health Organization (WHO), more than one billion people worldwide live with disabilities, and many of them lack adequate access to digital technology in keeping up with the times [1]–[4]. Persons with disabilities are often marginalized in the planning and development of technology, resulting in a gap between them and the general population in terms of access to technology. This phenomenon creates significant barriers for individuals with disabilities to participate in and benefit from advances in digital technology. This disparity is further exacerbated by the fact that not all digital technologies are designed with the specific needs of persons with disabilities in mind [5].

Currently, the issues of digitalization and inclusion are widely discussed. The implementation of inclusive technology not only fulfills the daily needs of persons with disabilities but also enables them to participate more actively in social, economic, and cultural life. Various initiatives have been undertaken to promote the development of inclusive technology, one of which is the application of universal design. The principles of universal design ensure that every digital application or device can be accessed by users of diverse backgrounds and abilities [6]–[8].

Inclusive technology provides broader opportunities and support for persons with disabilities to engage with the digital world according to their individual needs. This support takes various forms, such as text, audio,

visuals, or touch-based interfaces, all designed to be accessible to users with varying levels of ability [9]–[11]. This approach not only enables persons with disabilities to connect with the digital environment but also grants them access to services that were previously difficult to reach, such as online education, remote employment opportunities, and interactive entertainment supported by accessibility features [12].

From an Islamic perspective, the adoption of inclusive technology aligns with the principles of justice and respect for the dignity of every individual, regardless of physical or mental impairments. The Qur'an affirms that every human being has equal rights in social life, including access to education and active participation in society. For instance, Surah An-Nur, verse 61, states that persons with disabilities have equal rights to participate in social activities and enjoy their basic rights:

"There is no restriction on the blind, or the lame, or the sick (to eat together with you in your homes)..." (Qur'an, An-Nur [24]: 61).

This verse indicates that discrimination against persons with disabilities is prohibited in society and that there is an obligation to grant them equal rights. In this regard, inclusive technology can be considered a form of social justice that facilitates the full participation of persons with disabilities in various aspects of life [13]–[15].

LITERATURE REVIEW

Persons with disabilities are individuals with physical, sensory, intellectual, or psychosocial impairments. They often face obstacles and challenges in accessing and utilizing technology as well as public services. Furthermore, in socio-economic matters, persons with disabilities are frequently overlooked in the formulation of digital policies, thereby exacerbating existing social inequalities [16].

Inclusive technology refers to technology designed to be accessible, comprehensible, and usable by all individuals, including persons with disabilities, without the need for significant additional adaptation [17], [18]. As such, inclusive technology plays a crucial role in fostering a more equitable and just society. It enables individuals of varying abilities to interact with technology independently and enhances their quality of life, particularly in areas such as employment and education [19].

The development of inclusive technology is driven by the principle of universal design—a design approach that addresses the needs of diverse user groups, ensuring accessibility for all individuals. This principle supports the full integration of persons with disabilities into the digital sphere and reduces the accessibility barriers they encounter, thereby enabling a broader range of users to benefit from existing technologies [20], [21]. Universal design also improves usability for other groups facing temporary or situational limitations, such as individuals in a hurry or those operating in noisy environments. This design approach is increasingly relevant in today's rapidly evolving digital landscape, where technological advancements often outpace most users' ability to access or utilize them effectively.

METHODOLOGY

This study employs a descriptive qualitative approach using the library research method to explore the role of inclusive technology in promoting social equity for persons with disabilities, as well as its relevance to Islamic values. This method was selected because it allows the researcher to conduct an in-depth investigation of various forms of literature related to digital inclusion, disability rights, and Islamic ethics, without the need for primary data collection. The secondary data sources used include reputable international journals, national academic publications, reports from non-governmental organizations (NGOs), and official documents from global organizations such as the WHO and UNESCO concerning disability and access to technology.

The data collection process was conducted systematically through three main stages. First, source identification was carried out to select relevant literature based on topic, scope, and academic quality. Selection criteria included recency, authoritativeness, and relevance to the themes of digital inclusion and the principles of social justice in Islam. Second, during the data collection stage, the researcher gathered documents such as journal articles, research reports, case studies, as well as both classical and contemporary literature from an Islamic perspective. Third, data analysis was conducted using a thematic analysis approach, identifying patterns, key themes, and interrelationships among concepts found in the literature. The analysis also incorporated interpretive reinforcement grounded in the values of *maqāṣid al-sharī'ah* as a normative framework to understand the integration between technology and Islamic ethical principles (see figure 1).

Through this approach, the study aims to present a comprehensive synthesis of how inclusive technology can serve as an instrument of social empowerment, while also embodying the actualization of justice and the respect for human dignity from an Islamic perspective.

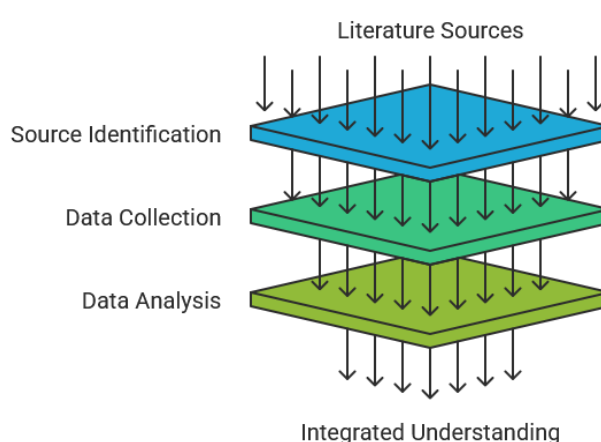


Figure 1. Research Flow

RESULTS AND DISCUSSION

Inclusive Technology for Persons with Disabilities: Concepts and Local Practices

Inclusive technology refers to the implementation of technological solutions designed to accommodate the needs of all individuals, regardless of physical, sensory, intellectual, or psychosocial limitations. In the context of persons with disabilities, the application of such technology is particularly vital in facilitating adaptation to an increasingly digital world. Inclusive technology enables individuals with disabilities to access information, communicate effectively, and participate actively in society through innovations tailored to their specific needs [22]–[24]. Several key implementations of inclusive technology include the following:

a) Screen Readers and TalkBack for the Visually Impaired

Screen readers and TalkBack are device features or software applications that convert on-screen text into audible speech, enabling individuals with visual impairments to access digital content. These technologies support users in reading documents, navigating applications, and browsing the internet through synthesized voice output. They also provide auditory guidance for interacting with touch-based interfaces, such as websites and mobile applications. *TalkBack* is a built-in feature on Android devices, while *VoiceOver* is available on Apple devices. These tools promote greater independence by enabling users to read electronic books and documents, access digital learning materials, communicate via email or messaging platforms, and engage with social media.

Despite their advantages, these technologies face challenges, including limited website optimization that hinders smooth navigation, reduced usability in noisy environments due to reliance on audio output, the high cost of premium screen reader software, and the need for training—particularly for new users.

b) Voice Recognition for the Hearing Impaired

Voice recognition technology involves the conversion of spoken language into written text, making it especially beneficial for individuals with hearing impairments. This technology generates automatic subtitles that assist in understanding spoken content in videos or live conversations. When integrated into digital platforms, voice recognition enhances the accessibility of multimedia content by providing real-time captions. It also supports live transcription in online meetings and virtual classrooms, enabling users to engage more effectively with digital communication and information.

Nevertheless, voice recognition systems also encounter limitations. These include difficulties in accurately recognizing certain accents or indistinct speech, dependency on stable internet connections for real-time processing, and additional costs for access to advanced voice recognition features. Despite these obstacles, the technology offers substantial benefits, such as facilitating real-time communication, improving access to online conferences, and enhancing comprehension of educational video materials.

c) Virtual Assistants

Virtual assistants—including Siri, Alexa, and Google Assistant—are software applications that allow users to perform tasks using voice commands. These tools are particularly advantageous for individuals with disabilities who face challenges in typing or manually operating digital devices. Virtual assistants enable users to access weather updates, calendars, reminders, and other services, and are compatible with a wide range of devices, from smartphones to smart home systems. Through voice commands, users can conduct online searches, schedule reminders, or engage in entertainment with ease.

For individuals with disabilities, these technologies offer improved digital accessibility, enhanced autonomy in managing daily activities, and increased efficiency in executing everyday tasks. However, virtual assistants also present several concerns. These include privacy risks due to the transmission of voice data to external servers, limitations in language and dialect support, errors in voice recognition—especially with certain accents or unclear articulation—dependence on a stable internet connection, and constraints in executing highly specific or complex commands.

Globally, inclusive technologies such as screen readers, voice recognition systems, and virtual assistants have significantly improved digital access [25]. Tools like TalkBack (Android) and VoiceOver (iOS) allow visually impaired users to navigate digital content. Similarly, voice recognition and live transcription features enable hearing-impaired individuals to participate in virtual meetings and educational platforms.

Despite these advancements, challenges such as high costs, lack of digital literacy, and inadequate infrastructure continue to hinder effective utilization, especially in developing countries [26], [27]. These issues become more pressing when examined through the lens of Islamic educational institutions, which often lack the technological capacity and training resources to adopt such innovations fully.

In Indonesia, several initiatives have been introduced to promote inclusive technology, particularly in the context of religious-based educational institutions. One notable case is the implementation of assistive technologies in SLB Muhammadiyah Yogyakarta and collaboration with madrasah inklusif under the supervision

of the Ministry of Religious Affairs (Kemenag). These schools have started integrating tools such as text-to-speech software, high-contrast digital content, and sign language interpretation for Islamic subjects [28]–[30].

A specific example is the “*Inklusi Digital Santri*” program piloted in 2023 at a pesantren in Sleman, Yogyakarta. In collaboration with Universitas Muhammadiyah Yogyakarta and local NGOs, this initiative provided training for teachers on using Universal Design for Learning (UDL) tools, including the development of interactive Qur’anic learning modules accessible via smartphones with accessibility features. The program showed a marked increase in student participation among visually and hearing-impaired santri, particularly in online fiqh and tafsir classes [31]–[33].

However, this study also identified several persistent obstacles that continue to hinder the effective implementation of inclusive technology within Islamic educational settings. One of the primary challenges is the lack of confidence among teachers in using assistive technologies, which largely stems from inadequate training and limited exposure to digital inclusion frameworks. In addition, internet connectivity in many rural pesantren remains unreliable, severely restricting the functionality of web-based inclusive platforms and learning tools that require stable online access. Furthermore, there exists a cultural reluctance within certain communities to fully integrate students with severe disabilities into mainstream religious classrooms, often due to prevailing misconceptions or insufficient institutional support.

Despite these challenges, the integration of inclusive technology into Islamic education in Indonesia—though still in its early stages—shows significant promise. It enhances the accessibility of religious knowledge for all students, thereby actualizing the maqāṣid al-sharī’ah principle of *hifẓ al-dīn* (preservation of religion). Inclusive digital tools empower learners with disabilities to actively participate in da’wah activities by enabling them to engage in online discussions, Qur’anic recitations, and the creation of Islamic digital content. More broadly, this integration promotes equity in access to Islamic scholarship, reflecting Islam’s foundational value of social justice (*‘adl*). Nonetheless, the absence of coherent policy frameworks and sustained capacity building risks reducing inclusion to a symbolic gesture rather than a substantive educational reform [34]–[36].

To address these limitations and improve the scalability and sustainability of inclusive practices, several key recommendations are proposed. First, policy integration is essential: the Ministry of Religious Affairs must establish and enforce digital accessibility standards across madrasah and pesantren to ensure consistent implementation. Second, teacher education programs—both pre-service and in-service—should incorporate dedicated modules on inclusive digital tools and Universal Design for Learning (UDL) principles to enhance educators’ competence and confidence. Finally, fostering inclusive learning environments requires meaningful community engagement. Collaboration with parents, local ulama, and disability advocacy organizations will be vital in cultivating an educational culture rooted in Islamic ethics and genuine inclusion.

Universal Design for Learning (UDL) in Digital Education

Universal Design for Learning (UDL) is a pedagogical approach designed to create learning environments that are accessible to all students, including those with special needs. The core principles of UDL include the presentation of learning materials in multiple formats (*multiple means of representation*), allowing diverse ways for students to express their understanding (*multiple means of expression*), and offering various strategies to motivate and engage students (*multiple means of engagement*). In the context of online education, these principles are embodied through the use of flexible and accessible digital learning modules, such as *Universal eLearner*, which provide digital text, interactive quizzes, instructional videos, and activities that support diverse learning styles [27].

The relevance of UDL is particularly significant for students with disabilities, as it offers features such as high contrast, large print text, and screen reader technologies that facilitate access to educational content. These features have been proven effective in supporting students with visual impairments, motor difficulties, or reading challenges, enabling them to participate in learning more independently and equitably. Studies have also shown that by applying UDL principles, the need for additional adaptations in the learning process can be significantly reduced, as instructional materials are already designed to be usable by a wide range of learners.

However, the implementation of UDL in Indonesia—especially within religious-based educational institutions such as *madrasahs* and *pesantrens*—remains limited. One of the main barriers is the low level of digital literacy among educators, which hampers their ability to effectively utilize digital technologies that support accessibility. In addition, the absence of explicit regulations on UDL within the national education system presents another significant challenge [37]–[39]. A local case study in Yogyakarta revealed that applying universal design principles in public facilities such as mosques can enhance autonomy and accessibility for persons with disabilities, suggesting that similar principles would be highly applicable in educational settings as well.

Accordingly, several key recommendations can be proposed. First, intensive training programs for teachers are needed to enhance their understanding of UDL principles and their application in digital contexts. Second, the Ministry of Religious Affairs and the Ministry of Education and Culture should integrate UDL into the national curriculum and inclusive education policies. Third, the development of accessible and inclusive digital learning platforms must actively involve disability communities to ensure that their real needs are adequately addressed. Through a systematic approach, UDL has the potential to serve as a strategic solution for creating equitable and inclusive online education in Indonesia.

Islamic Perspectives on Inclusive Digital Access

Islam fundamentally upholds the values of social justice and equitable access for all humanity, including in modern contexts such as digital accessibility. These values are grounded in the teachings of the Qur'an, the example of the Prophet Muhammad (peace be upon him), and the normative framework of *maqāṣid al-sharī'ah* (the higher objectives of Islamic law) [40]–[42].

First, the Qur'an explicitly teaches the principles of equality and respect for diversity, which serve as the foundation of inclusivity. In Surah An-Nur (24:61), Allah affirms that there should be no barriers preventing persons with disabilities from participating in social life: “*There is no restriction upon the blind, nor upon the lame, nor upon the sick...*”.

This verse illustrates Islam's recognition of the rights of persons with special needs not to be marginalized. Furthermore, Surah Al-Hujurat (49:13) emphasizes that human dignity is not based on physical condition but on piety and moral character: “*O mankind! Indeed, We have created you from male and female and made you peoples and tribes so that you may know one another...*” This underscores the importance of social justice in building an inclusive digital society.

Second, the Prophet Muhammad (peace be upon him) provided a tangible example of building an inclusive community, particularly in honoring individuals with disabilities. A notable example is Abdullah ibn Umm Maktum, a blind companion who was entrusted by the Prophet with significant responsibilities, including being appointed as a *mu'adzin* (caller to prayer) and acting as a prayer leader in the Prophet's absence from Medina. This demonstrates that disability is not a barrier to active societal contribution—a message that holds deep relevance in today's digital context, where technology ought to empower rather than exclude.

Third, within the framework of *maqāṣid al-sharī'ah*, digital inclusion can be interpreted as part of the effort to uphold the five essential objectives of Islamic law. In this context:

- *Ḥifẓ al-dīn* (preservation of religion) implies the importance of digital access for persons with disabilities to engage in *da‘wah* (Islamic outreach), religious studies, and online Islamic content.
- *Ḥifẓ al-‘aql* (preservation of intellect) necessitates inclusive online education so that every individual, without exception, can gain access to knowledge.
- *Ḥifẓ al-nafs* (preservation of life) highlights the importance of access to digital health information and services that support physical and mental well-being, especially for socially or physically vulnerable populations.

Ultimately, inclusivity in digital access constitutes a practical realization of *maṣlaḥah ‘āmmah* (public interest), a foundational principle in Islamic jurisprudence that encourages the development of policies and systems that benefit the broader society. In the digital age, creating accessible platforms, services, and online content for all—including persons with disabilities, the elderly, and other marginalized groups—is not only an ethical imperative but also a direct implementation of Islamic values that promote justice, compassion (*raḥmah*), and collective well-being [43].

CONCLUSION

The advancement of inclusive digital technology provides a transformative opportunity to improve access, participation, and equity for persons with disabilities—particularly in the field of Islamic education. Technologies such as screen readers, voice recognition, virtual assistants, and Universal Design for Learning (UDL) principles allow learners with various limitations to access knowledge, communicate, and contribute to society with greater independence and dignity. These developments must be integrated into Islamic educational environments, not only as technical solutions but as expressions of Islamic values that promote justice (*‘adl*), compassion (*raḥmah*), and inclusion. From an Islamic ethical framework, inclusive digital access aligns with the objectives of *maqāṣid al-sharī‘ah*, such as the protection of religion, intellect, and life. The Qur’anic verses and prophetic practices emphasize equal rights and the social inclusion of all individuals, including those with disabilities. However, practical challenges such as low digital literacy among educators, limited infrastructure, and policy gaps still hinder implementation. Addressing these challenges requires collaborative efforts from educational institutions, religious leaders, technology developers, and policymakers to ensure that inclusive technology serves as both a moral and functional instrument for building a just and inclusive society.

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Author Contribution

All authors contributed equally to the main contributor to this paper, some are as chairman, member, financier, article translator, and final editor. All authors read and approved the final paper.

Conflicts of Interest

All authors declare no conflict of interest.

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