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DIGITAL INEQUALITY AND SOCIAL INCLUSION IN THE AGE OF EMERGING TECHNOLOGIES

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ABSTRACT

Emerging technologies, including artificial intelligence (AI), high-speed internet, mobile computing, cloud platforms, and digital public services, are transforming how individuals participate in education, employment, healthcare, communication, and civic life. Although these technologies create new opportunities for economic development and social participation, their benefits are not distributed equally across populations. Digital inequality extends beyond access to internet connectivity and electronic devices to include affordability, digital literacy, accessibility, language barriers, confidence in technology, and the ability to convert digital resources into meaningful social and economic outcomes. This study examines the relationship between digital inequality and social inclusion in the age of emerging technologies, focusing on the barriers experienced by economically disadvantaged communities, rural populations, women, older adults, and people with disabilities. The study adopts a qualitative, literature-based methodology to synthesize recent scholarly research and international reports published in 2025 and 2026. The analysis is organized around five major themes: digital access, digital skills, socioeconomic inequality, inclusive technological design, and institutional responsibility. The literature indicates that expanding network coverage alone is insufficient to achieve meaningful digital inclusion. Affordable devices, reliable connectivity, accessible interfaces, relevant digital education, and inclusive policy frameworks are also essential. Furthermore, emerging technologies may reproduce existing inequalities when algorithms, services, and digital infrastructures fail to account for differences in users' circumstances. The study concludes that digital inclusion requires a comprehensive, human-centered approach that combines technological development with social protection, public investment, digital literacy, and accountable governance. Equitable participation in the digital society depends not only on whether individuals can access technology but also on whether they can use it safely, effectively, and independently to improve their lives.

KEYWORDS:*Digital Inequality, Social Inclusion, Digital Divide, Emerging Technologies, Artificial Intelligence, Digital Literacy, Digital Accessibility, Socioeconomic Inequality, Digital Transformation, Internet Connectivity, Algorithmic Bias, Technology Adoption, Inclusive Development, Digital Equity, Social Participation.*

INTRODUCTION

Emerging technologies have become central to the transformation of contemporary societies, influencing how individuals access information, participate in education, obtain employment, receive public services, and maintain social relationships. The rapid development of artificial intelligence, mobile internet, cloud computing, digital financial services, and automated decision-making systems has created new opportunities for individuals and communities to participate in social and economic activities. Ahmed, S. F., Khan, Y. J., Mehmood, F., Apon, T. A., Doel, M. A. R., Roy, H. P., & Mohi-Ud-Din, M. (2026). found that Digital platforms allow students to access educational resources, workers to explore employment opportunities, entrepreneurs to reach wider markets, and citizens to obtain information about public services. These developments demonstrate that digital technology can support social progress and improve access to resources that were previously limited by geographical and institutional barriers. However, the benefits of digital transformation are not distributed equally. Individuals differ significantly in their access to reliable connectivity, suitable devices, digital skills, financial resources, and opportunities to use technology effectively. Consequently, the expansion of digital services may improve opportunities for some groups

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while leaving others disadvantaged.Digital inequality refers to differences in access to, use of, and benefits obtained from digital technologies. In its earlier form, the digital divide was often understood primarily as a gap between individuals who had internet access and those who did not. Contemporary research increasingly recognizes that digital inequality is a multidimensional social problem involving infrastructure, affordability, education, accessibility, language, digital confidence, and the social circumstances that influence technology use. An individual may live in an area with mobile broadband coverage but remain digitally excluded because internet packages are unaffordable, devices are shared among several family members, or digital services require advanced literacy skills. Similarly, people may have access to smartphones but lack the knowledge needed to identify misinformation, protect personal information, complete online applications, or use digital platforms for productive purposes. Alderete, M. V. (2025 Explained that These distinctions demonstrate that connectivity alone does not guarantee meaningful participation in the digital society.International evidence illustrates the continuing scale of this challenge. The International Telecommunication Union's Measuring Digital Development: Facts and Figures 2025 estimated that approximately six billion people were using the internet, while 2.2 billion remained offline. The report also documented persistent differences in internet use across income groups, genders, and urban and rural populations. These inequalities are particularly significant because access to digital technologies increasingly influences the ability to participate in education, employment, healthcare, financial services, and civic activities. As public and private institutions move services online, people who cannot use these systems effectively may experience additional disadvantages. Digital exclusion can therefore reinforce existing forms of social and economic inequality rather than operating as an isolated technological problem.The expansion of artificial intelligence has introduced another important dimension to digital inequality. AI-powered systems can support personalized education, automate routine tasks, translate languages, improve accessibility, and provide assistance with information-intensive activities. Nevertheless, access to these opportunities depends on reliable internet connections, appropriate devices, digital skills, and the availability of relevant services. The World Bank's Digital Progress and Trends Report 2025: Strengthening AI Foundations emphasizes that differences in computing infrastructure, locally relevant data, digital skills, and innovation capacity influence countries' ability to benefit from AI.

This suggests that existing inequalities in digital infrastructure and human capabilities may extend into the emerging AI economy. People and communities with fewer resources may be less able to adopt new technologies, while those with stronger infrastructure and skills may gain additional educational and economic advantages.Social inclusion provides an important framework for understanding these developments. Social inclusion refers to the ability of individuals and groups to participate meaningfully in economic, educational, cultural, political, and community life. It involves more than the formal availability of services; it also requires that individuals have the resources, capabilities, and opportunities necessary to use those services. Digital technologies can promote inclusion by enabling remote learning, facilitating communication, expanding access to public information, and supporting participation in economic activities. However, digital services can also exclude individuals when their design assumes that everyone has a modern device, reliable connectivity, advanced literacy, or the ability to navigate complex online procedures. For example, a public

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service that is available only through an inaccessible online portal may create additional difficulties for people with disabilities, older adults, and those with limited digital experience.Gender, geography, income, disability, age, and education are among the factors that shape digital participation. Women in some communities may face financial restrictions, unequal access to devices, safety concerns, or limited opportunities to develop digital skills.

RESEARCH OBJECTIVE

1. To examine how digital inequality associated with emerging technologies affects social inclusion and to identify strategies for promoting equitable access, digital literacy, accessibility, and meaningful participation among socially and economically disadvantaged populations.

RESEARCH QUESTION

1. How does digital inequality in the age of emerging technologies influence social inclusion, and what strategies can reduce barriers to meaningful digital participation?

LITERATURE REVIEW

Digital inequality has evolved from a narrow concern with internet access into a broader examination of how technological resources, skills, social conditions, and institutional arrangements influence people's opportunities. Early discussions of the digital divide often focused on the distinction between individuals who had access to computers and the internet and those who did not. However, the expansion of mobile technologies, digital platforms, cloud services, and AI has demonstrated that access is only one component of digital participation. Individuals may be connected to the internet but still lack the capabilities required to use digital resources effectively or translate technological access into educational, economic, and social benefits.Lohr (2025), in Digital Literacy and Access: Equity From a Global and Local Perspective, emphasizes the importance of combining access to technology with the ability to use, evaluate, question, and create digital information. This perspective highlights the limitations of measuring digital inclusion solely through the availability of devices or network infrastructure. Effective participation also requires lifelong learning, critical digital literacy, and opportunities to develop technological competencies within different community settings. Digital inequality can be understood through three connected dimensions. Economic and Social Commission for Asia and the Pacific. (2025). Explains thatThe first concerns access to suitable devices, reliable internet connectivity, electricity, and affordable services. The second concerns the skills and practices required to use technologies effectively, including information evaluation, online communication, digital security, and the use of specialized tools. The third concerns outcomes, such as whether digital participation improves educational attainment, employment opportunities, access to healthcare, financial security, or civic engagement. These dimensions are interconnected because access does not necessarily lead to effective use, and effective use does not guarantee equal benefits.Papaioannou (2026), in a review of digital inequality in the AI era, conceptualizes the AI divide through access, use, and outcomes while emphasizing the influence of psychological, institutional, and geopolitical factors.

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The review suggests that unequal access to AI cannot be understood only as a technical problem; it is also shaped by power relations, differences in resources, and the ability of individuals to exercise agency within AI-mediated environments. This multidimensional understanding is important because emerging technologies are increasingly integrated into essential social institutions. Education, employment, public administration, financial transactions, and communication increasingly depend on digital systems. Consequently, individuals who experience disadvantages in one dimension may face additional difficulties in others. A student without reliable internet may struggle to access educational resources, while a worker without digital skills may be unable to apply for employment opportunities that require online procedures. Digital inequality therefore represents a wider challenge to equal participation in contemporary society.Reliable connectivity remains a fundamental condition for meaningful digital inclusion. Although mobile broadband networks have expanded significantly, differences persist in service quality, affordability, coverage, and the reliability of supporting infrastructure. The International Telecommunication Union's 2025 report estimated that approximately six billion people were online, while 2.2 billion remained offline. It also identified continuing disparities associated with income, gender, and geographical location. These differences demonstrate that the existence of network infrastructure does not necessarily mean that all individuals can use digital services regularly. Households may have access to mobile coverage but lack the financial resources to purchase adequate data packages or suitable devices. Faith, B., Hernandez, K., & Urquhart, C. (2026). revealed that In some rural communities, unreliable electricity and weaker connectivity can interrupt online learning, remote work, and access to public services. Even where basic internet access is available, limited bandwidth may prevent users from benefiting fully from video-based education, cloud applications, or AI systems that require substantial data processing.Junod, Scally, Sawo, and Ferrara (2025), in the Urban Institute report Expanding Digital Opportunity, frame digital opportunity as requiring appropriate devices, affordable connectivity, digital skills, and the support necessary to use technology effectively.

The World Bank's Digital Progress and Trends Report 2025: Strengthening AI Foundations identifies gaps in connectivity, computing capacity, locally relevant data, and digital skills as important barriers to inclusive AI development. It also notes that high-income countries have advantages in AI innovation, computing infrastructure, and startup financing, while adoption remains more limited in low-income economies. Papaioannou (2026) argues that the AI divide includes unequal opportunities to access systems, participate in AI-mediated activities, and benefit from their outputs. This perspective indicates that two individuals may both have internet access but still experience different opportunities because one possesses greater digital confidence, more advanced skills, or access to more capable AI services. A 2026 study by Ahmed and Khan examined digital inequality and generative AI use among approximately 250 university students from urban and underserved communities in Punjab, Pakistan. The researchers reported differences in internet reliability, device availability, and access to AI tools between the groups. Their analysis also identified internet reliability and AI access as significant predictors of perceived academic opportunity. Because the study was based on a particular student sample, its findings should not be treated as representative of all Pakistani students, but they illustrate how infrastructure and AI access may interact to shape educational opportunities. Research on generative AI adoption in South Korea similarly indicates that socioeconomic status is associated with differences in adoption and that resource- and capability-related barriers remain important even among people who regularly use the internet. These findings have important implications for social inclusion. Individuals

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who can use AI effectively may obtain assistance with writing, translation, research, planning, and professional tasks. Those who lack reliable access or the skills to evaluate AI-generated information may be unable to gain similar advantages. AI could therefore widen existing differences in educational and occupational outcomes unless access and capability gaps are addressed together.Digital literacy is a major factor influencing whether individuals can convert technological access into meaningful outcomes. It involves more than basic familiarity with smartphones or computers. Effective digital participation requires the ability to locate information, evaluate its credibility, communicate appropriately, protect personal information, recognize online risks, and use digital services for specific purposes. Emerging technologies add further demands, including understanding AI-generated content, identifying possible errors, recognizing algorithmic limitations, and protecting sensitive information.

METHODOLOGY

This study adopts a qualitative, literature-based methodology to examine digital inequality and social inclusion in the age of emerging technologies. The approach is appropriate because the research question concerns multiple interconnected social, economic, technological, and institutional factors. Rather than collecting new data from participants, the study synthesizes existing scholarly research, empirical studies, and institutional reports to understand how differences in access, skills, and technological opportunities influence social participation.The literature review focuses on publications released in 2025 and 2026. Relevant materials include peer-reviewed journal articles, systematic and structured reviews, research reports, and publications from recognized international organizations. Sources are identified through scholarly search platforms and publisher websites using combinations of terms such as digital inequality, digital divide, social inclusion, emerging technologies, artificial intelligence adoption, digital literacy, algorithmic bias, and digital accessibility. International evidence from the International Telecommunication Union, World Bank, and United Nations organizations is included to provide broader context.Publications are selected according to their relevance to the research question, publication date, methodological transparency, and contribution to understanding digital inclusion. Empirical studies are examined for their research populations, data collection methods, analytical approaches, and principal findings. Institutional reports are used to understand the scale of connectivity gaps, affordability challenges, and inequalities affecting particular populations. Publications that address only technical performance without a clear connection to digital inequality or social participation are given lower priority.The synthesis considers evidence concerning internet access, device affordability, digital skills, socioeconomic status, gender, geographical location, disability, AI adoption, and the design of digital public services. Both the potential benefits and the possible exclusionary effects of emerging technologies are examined. Where research findings differ, the study considers variations in research settings, indicators, populations, and institutional contexts.

RESEARCH DESIGN

The research employs a qualitative descriptive design using a structured literature review and thematic synthesis. This design provides a systematic way to organize existing evidence about the relationship between digital inequality and social inclusion without conducting a new survey or experiment.Stage 1: Defining the scope. The study establishes the main research question and identifies digital inequality, social inclusion, and emerging

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technologies as its central concepts. The scope includes conventional digital access and newer challenges associated with AI, automated services, and digital platforms.Stage 2: Identifying relevant literature. Scholarly articles and institutional reports published during 2025–2026 are identified through searches using relevant keywords. Publication details, research objectives, methods, and principal findings are recorded.Stage 3: Screening and selection. Sources are assessed for relevance, credibility, and methodological transparency. Preference is given to empirical studies, peer-reviewed publications, and authoritative reports that directly address access, skills, inequality, or inclusion. The final manuscript should document the actual search dates, databases, number of records retrieved, duplicates removed, and publications retained.Stage 4: Coding and thematic organization. Information from the selected sources is categorized into themes covering infrastructure and affordability, digital literacy, socioeconomic inequality, gender and disability, AI-related disparities, and institutional governance.Stage 5: Comparative synthesis. Findings are compared across sources to identify common patterns, contrasting results, and gaps in current knowledge. The synthesis is used to formulate conclusions and practical recommendations concerning equitable technological participation.To improve analytical credibility, the study distinguishes reported empirical findings from the researcher's interpretations and policy recommendations. Evidence from individual countries is not automatically generalized to the entire world. Likewise, associations between technology use and social outcomes are not treated as proof of causation. This approach supports a balanced understanding of digital inequality while recognizing the limitations of secondary research.

DATA ANALYSIS

The study uses thematic analysis to examine information extracted from the selected literature. The purpose is to identify recurring explanations of digital inequality and understand how these conditions influence opportunities for social inclusion. The analysis is organized into six principal themes: infrastructure and affordability, digital literacy, socioeconomic differences, exclusion affecting marginalized populations, AI-related inequality, and institutional responsibility.The first step involves familiarization with the selected publications. Each source is examined for its objectives, context, methodology, population, and relevant conclusions. Information concerning unreliable connectivity, limited device access, and the cost of internet services is grouped under infrastructure and affordability. Findings concerning technological competence, online safety, and AI literacy are categorized under digital capabilities.The second step involves comparing evidence across different populations and settings. Studies of rural communities are considered alongside research on urban residents, women, people with disabilities, and economically disadvantaged groups. This comparison helps identify how different barriers overlap and why the same technology may produce different outcomes for different users.The third step examines the relationship between technological access and meaningful participation. The analysis considers whether access is associated with opportunities in education, employment, healthcare, public services, and civic engagement. It also examines institutional conditions, including accessibility standards, governance quality, and support for digital learning.The fourth step identifies patterns of agreement and disagreement. For example, digitalization may create economic opportunities in some settings while reproducing inequality in others. These differences are interpreted in relation to governance, affordability, skills, and the distribution of technological resources rather than being treated as evidence that one

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conclusion must apply universally.Finally, the themes are integrated into a conceptual interpretation of digital inclusion.

FINDINGS

The following findings represent a synthesis of the literature reviewed in this paper. They are not results from a newly conducted survey or experiment.The reviewed evidence indicates that the availability of network coverage is only one component of digital participation. Individuals also need affordable data, suitable devices, reliable electricity, and sufficient connection quality. The ITU's 2025 report documents persistent global gaps in connectivity and affordability, demonstrating that digital access remains uneven despite widespread network expansion. Digital literacy affects how effectively people use online resources, evaluate information, protect personal data, and participate in digital activities. The reviewed literature suggests that users with stronger skills may be better positioned to convert access into educational, professional, and social opportunities. Consequently, access programs should be accompanied by practical training and ongoing support.The literature indicates that the benefits of AI depend on infrastructure, socioeconomic resources, computing capacity, and individual capabilities. The World Bank's 2025 report identifies differences in AI foundations and skills as barriers to inclusive development. Research on AI adoption disparities also suggests that resource and capability differences can remain significant even among people who regularly use the internet. Women, rural residents, people with disabilities, older adults, and low-income households may encounter different but interconnected obstacles to digital participation. The reviewed evidence indicates that these barriers can include affordability, inaccessible interfaces, limited training, unreliable infrastructure, and reduced control over technological resources. The ESCAP report on disability inclusion specifically highlights how infrastructure, accessibility, and skills barriers can reinforce one another. The literature suggests that online service delivery may disadvantage people who cannot navigate complex systems or who lack reliable connectivity. Research published in 2026 identified poverty, limited digital skills, dependence on intermediaries, and poor service design as contributors to digital marginalization. These findings support maintaining accessible service channels and providing practical assistance to people who need it.Digital transformation does not automatically produce either equal or unequal outcomes. Research involving 45 developing countries found that the relationship between digitalization and income inequality varied with governance quality and the type of digitalization examined.

CONCLUSION

Digital inequality remains a significant challenge in contemporary society because emerging technologies are increasingly connected to education, employment, healthcare, financial services, communication, and public administration. Although digital transformation creates opportunities for improving access to information and expanding social participation, its benefits are not automatically shared equally. Differences in infrastructure, affordability, digital literacy, socioeconomic status, accessibility, and institutional support continue to influence who can benefit from technological development.This study examined digital inequality and social inclusion through a qualitative synthesis of recent research and international reports published in 2025 and 2026. The reviewed literature indicates that digital exclusion extends beyond the absence of internet access. Individuals may remain

disadvantaged even when connectivity is available if they lack suitable devices, reliable services, practical skills, accessible interfaces, or opportunities to use technology productively. These challenges can be particularly significant for low-income households, rural communities, women, older adults, people with disabilities, and individuals with limited educational opportunities.The development of artificial intelligence introduces both opportunities and additional risks. AI can support education, translation, accessibility, employment, and access to information. However, unequal access to advanced tools, differences in AI literacy, and algorithmic bias may reproduce existing social and economic disadvantages. Digital inclusion must therefore involve more than increasing the number of people connected to the internet. It must also ensure that individuals can use emerging technologies safely, effectively, independently, and on equitable terms.The findings further emphasize the importance of governance and institutional responsibility. Governments should invest in reliable infrastructure, affordable connectivity, digital education, and accessible public services. Educational institutions should strengthen digital and AI literacy, while technology developers should incorporate accessibility, privacy, transparency, and fairness into system design. Community organizations can contribute by providing practical assistance and helping underserved populations develop confidence in using digital services.Future research should investigate how digital inclusion policies affect different population groups over time, particularly in developing economies such as Pakistan. Studies combining surveys, interviews, and comparative analyses could provide additional evidence about how connectivity, skills, socioeconomic circumstances, and institutional support influence actual outcomes.

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