Exploring the Impact of Emerging Technologies on Information Accessibility Enhancement*

[1]Y. Ofori and [2]B. Arthur
[1]University of Mines and Technology (UMaT), Tarkwa, Ghana
[2]Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana

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Abstract

This study explores the impact of emerging technologies on information accessibility enhancement, encompassing historical perspectives, technological evolution, and theoretical frameworks. The objective of this paper is to investigate the ramifications of emerging technologies on information accessibility enhancement, focusing on historical perspectives, technological advancements, and theoretical frameworks. A quantitative research approach was employed, utilising structured surveys to probe the impact of emerging technologies on information accessibility. Surveys were disseminated online to 500 participants in Ghana, featuring multiple-choice questions, Likert scale items, and open-ended queries. Data analysis primarily employed descriptive statistics to extract insights into the nexus between emerging technologies and information accessibility enhancement. The study revealed significant improvements in information accessibility due to emerging technologies, with respondents acknowledging the profound influence of Wi-Fi, 5G networks, and AI on access to information. However, challenges such as the digital divide and regulatory barriers were identified as hindrances to equitable access. The Diffusion of Innovations theory provided a comprehensive framework for understanding the adoption and dissemination of emerging technologies, highlighting the need for strategies to promote widespread adoption and effective use. The study underscores the importance of addressing existing barriers to fully realise the benefits of emerging technologies for enhancing information accessibility across diverse populations. A robust information and communication technology infrastructure should be prioritised to bridge the digital divide.

Keywords: Emerging Technology, Information Accessibility Enhancement, Digital Divide

1 Introduction

In an increasingly digital world, where access to information is fundamental for social, economic, and personal development, ensuring information accessibility for all individuals is paramount. The advent of emerging technologies presents both opportunities and challenges in this regard. While scholars have extensively studied the role of technology in enhancing information accessibility, there remain significant gaps in understanding the nuanced impact of emerging technologies on this critical issue (Bailey *et al*., 2022).

Scholars have dedicated extensive efforts to understanding and addressing the challenges associated with information accessibility. One of the prominent areas of focus has been the digital divide, which refers to disparities in internet access, digital literacy, and technology adoption among different demographic groups. Research by Norris (2001) has shed light on the existence of this digital divide, highlighting how it exacerbates information inequities. These studies underscore the importance of bridging the gap between technology haves and have-nots to ensure equitable access to information for all.

Another significant area of research is in the development and implementation of assistive technologies aimed at improving information access for individuals with disabilities. Scholars such as Brajnik (2000) and Lazar (2007) have explored various assistive technologies, including accessible interfaces and adaptive devices, emphasising their role in overcoming barriers to information access. These studies have underscored the importance of designing technologies that are inclusive by design, catering to the diverse needs of users with disabilities.

Language barriers present another obstacle to information accessibility, particularly in multilingual societies. Studies by Huang and Amano (2010) and Omona (2016) have highlighted the linguistic challenges faced by individuals who speak languages other than the dominant language of digital content (Kurniawan, 2008). These scholars emphasise the need for solutions that ensure content availability in diverse languages, such as effective language translation and cross-lingual information retrieval systems.

Additionally, the principles of user-centred design advocated by Norman (2013) have played a significant role in enhancing usability and accessibility in technology design. However, gaps persist in applying these principles to emerging technologies to comprehensively improve information accessibility. While user-centred design has been instrumental in creating intuitive and user-friendly interfaces, there is a need for further research to ensure that emerging technologies prioritise accessibility and cater to the diverse needs of users across different contexts.

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Prior research efforts have contributed valuable insights into understanding and addressing the challenges of information accessibility. Scholars have explored various dimensions of this issue, including the digital divide, assistive technologies, language barriers, and user-centred design. However, there remains a need for continued research to develop innovative solutions and address existing gaps in enhancing information accessibility, particularly in the context of emerging technologies. The advent of emerging technologies has significantly impacted information accessibility, a critical aspect of the digital age. However, the extent of this impact and its implications remain under-explored. Prior research has primarily focused on the role of social media in information accessibility and the evaluation of information accessibility and community adaptivity features for sustaining virtual learning communities.

Despite these efforts, a comprehensive understanding of how emerging technologies enhance information accessibility is lacking. For instance, the theoretical and empirical issues concerning the processing of social stimulus information remain unaddressed. Furthermore, the potential of artificial intelligence chatbots in revolutionising how individuals access information is yet to be fully explored (Hopkins *et al*., 2023).

This research gap is significant as it hinders the optimization of emerging technologies for information accessibility enhancement. Addressing this gap is crucial for bridging digital divides influencing socioeconomic, governmental, and accessibility factors on information technology (Pick and Azari, 2008), and promoting equality in the information age (Genc and Dulger, 2023).

Moreover, understanding the effect of the digital divide on information accessibility among different demographics, such as undergraduate students (Lucky and Achebe, 2013), and the role of government information and services in addressing the digital divide (Ptolomey, 2016), is essential. Therefore, this research seeks to explore the impact of emerging technologies on information accessibility enhancement, thereby contributing to the existing body of knowledge and informing future technological developments. To achieve this purpose, this study seeks to achieve these objectives;

1. To explore the impact of emerging technologies on enhancing information accessibility, with a focus on addressing the digital divide, language barriers, and the needs of individuals with disabilities.
2. To understand the role of user-centred design principles in the development and implementation of emerging technologies, and how these principles can be applied to improve information accessibility.

In light of the above research purpose and objectives, this research seeks to answer the following research questions:

1. How do emerging technologies influence information accessibility, particularly in terms of addressing the digital divide, overcoming language barriers, and catering to the needs of individuals with disabilities?
2. How can the principles of user-centred design be effectively applied in the development and implementation of emerging technologies to enhance information accessibility?

1.2 Review of Extant Literature

1.2.1 Historical Perspective on Information Accessibility

The historical perspective on information accessibility provides valuable insights into how access to information has evolved over time, influenced by technological advancements, societal changes, and shifts in communication paradigms. In ancient civilizations, early forms of communication such as oral traditions and cave paintings laid the groundwork for information exchange, contributing to the expansion of accessible information to diverse populations (Huehnergard, 2020).

The printing revolution, spearheaded by Johannes Gutenberg's invention of the printing press, democratised access to information by making printed materials more widely available (Janssen, 2021). This development facilitated information dissemination, leading to increased literacy rates and knowledge sharing (Adler, 2023). Additionally, library science played a pivotal role in enhancing information accessibility, with libraries serving as organised repositories of knowledge accessible to the public. The transition to the digital age further transformed library practices, with the emergence of digital libraries and online resources expanding access to information even further *(*Harinarayana *et al.*,2010).

Telecommunication networks, including the telegraph, telephone, and computer networks, revolutionised communication and information exchange, facilitating real-time communication and the rapid dissemination of information across vast distances (Huurdeman, 2008; Cullen 2001). These

networks played a crucial role in shaping how information is accessed and shared.

In the digital age, advancements in technology have further enhanced information accessibility, with digital technologies transforming how information is accessed and shared (Flyverbom *et al.*, 2016). Tools like Natural Language Processing (NLP) have enabled more efficient retrieval and processing of information, benefiting tasks such as text mining, information extraction, and the development of assistive technologies for individuals with disabilities (Arts *et al*., 2021). Communication design and linguistic change also influence information accessibility, impacting how information is presented and understood by different audiences (Aakhus, 2007). Practical applications of technology, such as the Digital Communication Assistance Tool (DCAT), demonstrate how innovative solutions can address specific accessibility challenges, such as obtaining medical history from foreign-language patients (Müller *et al*., 2020).

The advent of the internet and digital technologies has significantly influenced information accessibility, democratising access to information and breaking down geographical barriers (Castells, 2009). Advancements in NLP have further enhanced information accessibility, benefiting tasks such as text mining, information extraction, and the development of assistive technologies for individuals with disabilities (Arts *et al*., 2021).

Looking towards the future, several trends and challenges in information accessibility warrant consideration. The digital divide remains a significant barrier to equitable access to information, particularly for marginalised communities (Bawden and Robinson, 2009). Additionally, concerns about information overload, privacy, and security issues raise questions about data protection, surveillance, and the ethical use of personal information. While Artificial Intelligence (AI) presents opportunities for enhancing information accessibility, it also raises questions about bias, transparency, and accountability.

1.2.2 Evolution of Emerging Technology and Information Accessibility Enhancement

The evolution of emerging technology has significantly impacted information accessibility enhancement, shaping how individuals' access, retrieve, and utilise information. Wi-Fi technology has emerged as a cornerstone of modern connectivity, enabling seamless access to information across various devices (Castells, 2009). The evolution of Wi-Fi, marked by advancements such as OFDM and MIMO, has expanded network capacity and coverage, enhancing accessibility for users worldwide (Castells, 2009).

5G networks represent the next frontier in wireless communication, offering faster speeds and lower latency The rollout of 5G networks has the potential to revolutionise information accessibility by enabling real-time data transmission and supporting emerging technologies like IoT and AI. By providing high-speed connectivity, 5G networks can improve access to online resources and services, particularly in remote or underserved areas.

Despite the promise of emerging technologies, barriers to adoption persist. Factors such as cost, infrastructure limitations, and regulatory challenges can hinder the widespread deployment of new technologies (Borowiecki *et al.*, 2021). Addressing these barriers is essential for ensuring equitable access to emerging technologies and the benefits they offer (Borowiecki *et al*., 2021).

In the education sector, digital technologies play a crucial role in enhancing information accessibility. The integration of technology in classrooms can facilitate personalised learning experiences and provide access to a wealth of educational resources (Kirkwood and Price, 2014). However, disparities in access to technology and digital skills can exacerbate inequalities in education (Kirkwood and Price, 2014). Bridging this digital divide is essential for ensuring that all learners have equal opportunities to access and benefit from educational technology (Kirkwood and Price, 2014).

Furthermore, emerging technologies like AI and NLP have the potential to enhance information accessibility through innovative applications. AI-powered tools can automate tasks, analyse large datasets, and provide personalised recommendations, improving the efficiency and effectiveness of information retrieval (Jiang *et al*., 2021). Similarly, NLP technologies enable machines to understand and generate human language, facilitating more natural interactions with digital interfaces (Jurafsky and Martin, 2020). Harnessing the power of AI and NLP, developers can create accessible and user-friendly information systems that cater to diverse user needs (Jurafsky and Martin, 2020).

Thus, the evolution of emerging technology has profoundly transformed information accessibility, offering new opportunities to access, share, and utilise information. However, challenges such as barriers to adoption and digital inequalities must be

addressed to ensure that the benefits of emerging technologies are accessible to all.

1.2.3 Underlying Theory

The Diffusion of Innovations theory, conceived by Everett Rogers in 1962, offers a comprehensive framework elucidating the propagation and acceptance of novel ideas, products, or technologies within a social system (Rogers *et al*, 2019). This theory has found extensive application across a multitude of disciplines, such as health care, education, communication, and technology adoption, serving as a cornerstone for understanding the mechanisms of innovation adoption and diffusion.

In the exploration of the impact of emerging technologies on information accessibility enhancement, the Diffusion of Innovations theory provides invaluable insights into the factors influencing the adoption and dissemination of these technologies. The theory suggests that the adoption process of an innovation follows a predictable pattern, encompassing five stages: knowledge, persuasion, decision, implementation, and confirmation. These stages are influenced by several key factors, including the characteristics of the innovation, the communication channels used to disseminate information about the innovation, the social system where the innovation is introduced, and the perceived benefits and barriers associated with adopting the innovation.

The application of the Diffusion of Innovations theory in this research area is primarily due to its capacity to offer a systematic framework for understanding the adoption and diffusion of emerging technologies, such as Wi-Fi, 5G networks, artificial intelligence, and natural language processing, in the context of information accessibility enhancement. By leveraging this theory, this study identifies the factors that either facilitate or hinder the adoption of these technologies, predict adoption patterns, and devise strategies to promote the widespread adoption and effective use of these technologies, thereby enhancing information accessibility for all individuals.
Numerous studies have employed the Diffusion of Innovations theory across various research areas, providing empirical evidence of its efficacy in elucidating innovation adoption and diffusion processes. For instance, Dearing and Cox (2018) utilised the theory in health care settings to understand the adoption of new health technologies. Minishi-Majanja and Kiplang'at (2005) applied the theory in library and information science research to investigate the adoption of new information technologies in libraries. Chew et al. (2004) employed the theory to understand doctors' use of the internet in medical practice.

In the realm of information accessibility enhancement, the Diffusion of Innovations theory has been instrumental in understanding the adoption of various technologies. For example, Min *et al.* (2021) utilised the theory to understand consumer adoption of the Uber mobile application, while Pinho *et al*. (2021) applied the theory to the E-learning process in a higher education context.

In the field of library and information science research, the theory has been used to comprehend the role of librarians when introducing users to networked information. It has also been employed as a theoretical framework for telecentres.

In the context of emerging technologies, Pinho, et al (2021) discussed the potential for integrating diffuion of innovation principles into the life cycle assessment of these technologies. These instances underscore the versatility of the Diffusion of Innovations theory in understanding the adoption of emerging technologies across various domains, thereby enhancing information accessibility.

Thus, the Diffusion of Innovations theory serves as a valuable theoretical framework for studying the adoption and impact of emerging technologies on information accessibility enhancement.

2 Materials and Methods Used

The utilisation of a quantitative research approach in this study aims to systematically probe the ramifications of emerging technologies on enhancing information accessibility. Employing structured surveys as the primary means of data collection, the research endeavours to glean comprehensive insights from a diverse sample comprising 500 participants in Ghana. These surveys are disseminated through online platforms, social media channels, and community organisations, featuring a variety of question formats, including multiple-choice questions, Likert scale items, and open-ended queries. This methodological selection facilitates the collection of both quantitative and qualitative data, thereby enabling an exhaustive exploration of participants' perceptions, experiences, and preferences concerning the influence of emerging technologies on information accessibility.

Ensuring the representation of diverse viewpoints within the Ghanaian population, a stratified random sampling technique is deployed. This technique facilitates the inclusion of individuals across various demographic strata, such as age, gender, educational background, and levels of technological proficiency.

By encapsulating a broad spectrum of perspectives, the sampling methodology enriches the depth and validity of the study findings.

The quantitative data amassed through the surveys undergo meticulous statistical analysis, predominantly employing descriptive statistics. These statistical measures furnish concise summaries of the sample characteristics and the distribution of responses to survey inquiries. Through rigorous data analysis, the study aims to extract meaningful insights into the nexus between emerging technologies and information accessibility enhancement.

To safeguard the validity and reliability of the research outcomes, rigorous measures are implemented throughout the study. Pilot testing of the survey instrument is conducted to ascertain its clarity, comprehensibility, and alignment with the research objectives. Furthermore, strategies such as randomization of survey items and cross-validation of results are adopted to fortify the robustness and credibility of the research findings.

Ethical considerations constitute a cornerstone of this research endeavour. Informed consent forms are diligently furnished to all participants, elucidating the study's objectives, participants' rights, and the confidentiality protocols governing their responses. The utmost confidentiality and anonymity of participants' data are assured, with an unwavering commitment to utilising responses exclusively for research purposes.

The employment of a quantitative research approach, coupled with structured surveys and meticulous data analysis techniques, facilitates a systematic inquiry into the impact of emerging technologies on information accessibility enhancement (Saibakumo, 2021). Adhering to ethical tenets and employing robust methodological procedures, the study aspires to yield valuable insights that can inform the development and implementation of user-centred design principles, thereby contributing to the enhancement of information accessibility across diverse segments of society.

3 Results and Discussion

This section showcases the findings of the research as obtained from the data collected.

3.1 Biographic Analysis

3.1.1 Educational Background of Respondents

As depicted in Fig.1, the undergraduate students have the highest representation with 62.5% of the respondents. This is followed by the senior high school students and the postgraduate students, with 25% and 12.5% of the respondents respectively.

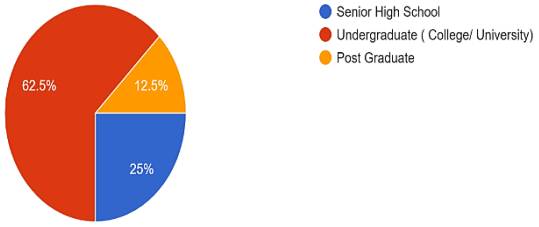

Fig. 1 Educational Background of Respondents.

3.1.2 Employment Status of Respondents

Fig. 2 indicates that the majority of respondents, accounting for 87.5%, are balancing employment with their studies, while the remaining 12.5 % are currently employed.

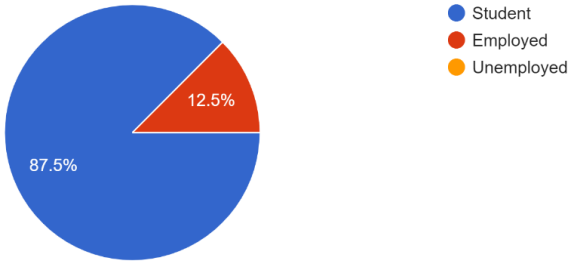

Fig. 2 Employment Status of Respondents.

3.2 Experience with Emerging Technologies

3.2.1 The Frequency of Emerging Technologies Use in Daily Life

The frequency of technology use in daily life, as depicted in Fig.3, underscores the profound influence of emerging technologies on our everyday experiences. The historical perspective on information accessibility provides valuable insights into how access to information has evolved over time, influenced by technological advancements, societal changes, and shifts in communication paradigms (Huehnergard, 2020; Janssen, 2021; Adler, 2023; Harinarayana *et al.*, 2010; Huurdeman, 2008; Flyverbom *et al.*, 2016; Arts *et al.*, 2021; Aakhus, 2007; Müller *et al.*, 2020; Castells, 2009; Bawden and Robinson, 2009).

The advent of the internet and digital technologies has significantly influenced information accessibility, democratising access to information and breaking down geographical barriers. Advancements in NLP have further enhanced information accessibility, benefiting tasks such as text mining, information extraction, and the development of assistive technologies for individuals with disabilities (Arts *et al.*, 2021).

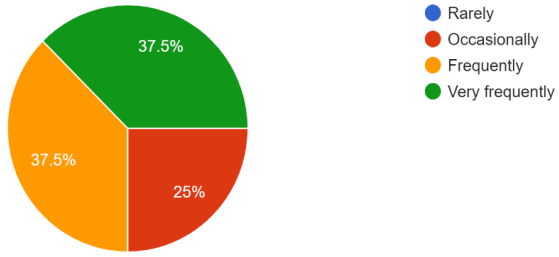

Fig. 3 Daily Usage Rate of Emerging Technologies by Respondents

The evolution of emerging technology has significantly impacted information accessibility enhancement, shaping how individuals' access, retrieve, and utilise information. Wi-Fi technology has emerged as a cornerstone of modern connectivity, enabling seamless access to information across various devices (Castells, 2009). The rollout of 5G networks has the potential to revolutionise information accessibility by enabling real-time data transmission and supporting emerging technologies like IoT and AI.

Despite the promise of emerging technologies, barriers to adoption persist. Factors such as cost, infrastructure limitations, and regulatory challenges can hinder the widespread deployment of new technologies (Borowiecki *et al.*, 2021). Addressing these barriers is essential for ensuring equitable access to emerging technologies and the benefits they offer.

In the education sector, digital technologies play a crucial role in enhancing information accessibility. The integration of technology in classrooms can facilitate personalised learning experiences and provide access to a wealth of educational resources (Kirkwood and Price, 2014). However, disparities in access to technology and digital skills can exacerbate inequalities in education. Bridging this digital divide is essential for ensuring that all learners have equal opportunities to access and benefit from educational technology (Kirkwood and Price, 2014).

Furthermore, emerging technologies like AI and NLP have the potential to enhance information accessibility through innovative applications. AI-powered tools can automate tasks, analyse large datasets, and provide personalised recommendations, improving the efficiency and effectiveness of information retrieval (Jiang *et al.*, 2021). Similarly, NLP technologies enable machines to understand and generate human language, facilitating more natural interactions with digital interfaces (Jurafsky and Martin, 2020).

The Diffusion of Innovations theory, conceived by Everett Rogers in 1962, offers a comprehensive framework elucidating the propagation and acceptance of novel ideas, products, or technologies within a social system (Rogers *et al*, 2014). This theory has found extensive application across a multitude of disciplines, such as health care, education, communication, and technology adoption, serving as a cornerstone for understanding the mechanisms of innovation adoption and diffusion (Dearing and Cox, 2018; Minishi-Majanja and Kiplang'at, 2005; Chew *et al*., 2004; Min *et al*., 2021; Pinho *et al*., 2021; Sharp and Miller, 2016).

The evolution of emerging technology has profoundly transformed information accessibility, offering new opportunities to access, share, and utilise information. However, challenges such as barriers to adoption and digital inequalities must be addressed to ensure that the benefits of emerging technologies are accessible to all. The Diffusion of Innovations theory serves as a valuable theoretical framework for studying the adoption and impact of emerging technologies on information accessibility enhancement.

3.2.2 Types of Emerging Technologies in Use

The integration and utilisation of emerging technologies are pivotal in enhancing information accessibility, as evidenced by the data in Fig 4. Half of the respondents regularly use AI and IoT, while the other half utilise Virtual Reality/Augmented Reality and NLP. These technologies have transformed how information is accessed, retrieved, and utilised.

Historical perspectives on information accessibility highlight a trajectory marked by technological advancements that have democratised access to information (Huehnergard, 2020; Janssen, 2021). In today's digital age, tools like NLP facilitate efficient retrieval and processing of information (Arts *et al*., 2021), aligning with Fig.4's indication of NLP's regular usage.

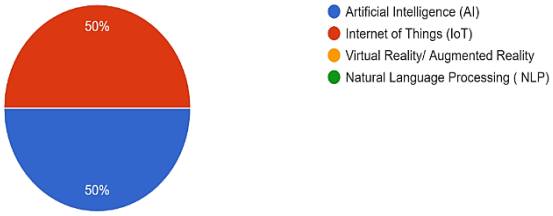

Fig. 4 Type of Emerging Technology in Use by Respondents in their Daily Lives

Emerging technologies like AI and IoT are not just buzzwords but integral components in the daily lives of individuals. AI-powered tools automate tasks and provide personalised recommendations (Jiang et al., 2021), reflecting their widespread adoption as shown in Fig 4. Similarly, IoT's role in connecting devices underscores its ubiquity.

However, despite these advancements, challenges persist. The digital divide remains a significant barrier to equitable access to technology (Bawden and Robinson, 2009). This is compounded by concerns about privacy and security issues associated with personal data usage.

Therefore, while emerging technologies continue to enhance information accessibility significantly - a trend corroborated by Fig.4, addressing associated challenges is paramount to ensuring that these advancements benefit all sectors of society equitably. The Diffusion of Innovations theory serves as a valuable theoretical framework for studying the adoption and impact of emerging technologies on information accessibility enhancement (Dearing and Cox, 2018; Minishi-Majanja and Kiplang'at, 2005; Chew *et al*., 2004; Min *et al*., 2021; Pinho *et al*., 2021)

3.3 The Impact Emerging Technologies on Information Accessibility Enhancement

This section answers the first research question and objective of the study indicating how emerging technologies influence information accessibility, particularly in terms of addressing the digital divide, overcoming language barriers, and catering to the needs of individuals with disabilities.

3.3.1 Perception on How Emerging Technologies Influences Information Accessibility

The transformative impact of emerging technologies on information accessibility is evident in the data presented in Fig 5. A significant majority of respondents, precisely 87.5%, believe that these technologies have significantly improved information accessibility. This aligns with the literature indicating the transformative role of AI and NLP in enhancing information retrieval and interaction with digital interfaces (Jiang *et al*., 2021; Jurafsky and Martin, 2020). These technologies automate tasks, analyse large datasets, and provide personalised recommendations, leading to efficient information retrieval.

Furthermore, a smaller fraction of respondents, precisely 12.5%, opined that there has been somewhat improvement in information accessibility due to emerging technologies. No respondent indicated a decline or no significant change in information accessibility. This overwhelming positive response underscores the pivotal role of AI and NLP in breaking down barriers to information access.

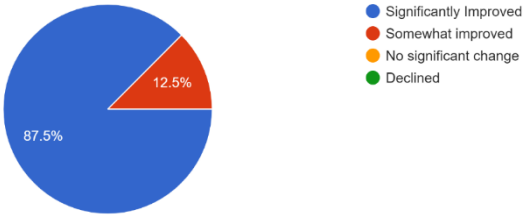

Fig. 5 How Emerging Technology Influences Information Accessibility

The advent of the internet and digital technologies has significantly influenced information accessibility as shown in Fig.5 above, democratising access to information and breaking down geographical barriers (Castells, 2009). Advancements in natural language processing (NLP) have further enhanced information accessibility, benefiting tasks such as text mining, information extraction, and the development of assistive technologies for individuals with disabilities (Arts *et al*., 2021).

3.3.2 How Emerging Technologies Influence Information Accessibility Enhancement in Terms of Addressing the Digital Divide, Overcoming Language Barriers, and Catering to the Needs of Individuals with Disabilities

The advent of emerging technologies has significantly impacted information accessibility, a critical aspect of the digital age. However, the extent of this impact and its implications remain under-explored. The data in Fig 6 reveals that 62.5% of respondents have experienced challenges related to accessing information due to the digital divide, language barriers, or disabilities, while 37.5% have not encountered such issues. This significant percentage underscores the persistent hurdles in information accessibility despite the advent of emerging technologies.

Emerging technologies like AI and NLP have the potential to enhance information accessibility through innovative applications. AI-powered tools can automate tasks, analyse large datasets, and provide personalised recommendations, improving the efficiency and effectiveness of information retrieval (Jiang *et al*., 2021). Similarly, NLP technologies enable machines to understand and generate human language, facilitating more natural interactions with digital interfaces (Jurafsky and Martin, 2020). Harnessing the power of AI and NLP, developers can create accessible and user-friendly

information systems that cater to diverse user needs (Jurafsky and Martin, 2020).

However, the data from Fig 6 indicates that a considerable proportion of individuals still face challenges, underscoring the need for more inclusive solutions. Language barriers remain a significant impediment to information accessibility. Huang and Amano (2010) and Omona (2016) emphasised linguistic challenges especially for non-native speakers of dominant digital content languages. The 62.5% facing accessibility issues as per Fig. 6 could be partially attributed to these language barriers, necessitating enhanced cross-lingual information retrieval systems and effective translation tools powered by AI and NLP.

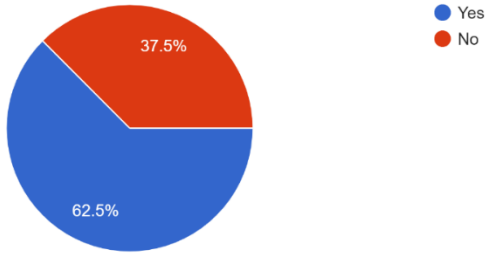

Fig.6 How Emerging Technologies Influence Information Accessibility, particularly in terms of addressing the digital divide, overcoming language barriers, and catering to the needs of individuals with disabilities

Furthermore, the data in Fig 6 highlights the need to address the requirements of individuals with disabilities. This calls for more natural interactions with digital interfaces facilitated by technologies like NLP (Jurafsky and Martin, 2020).

While emerging technologies have made strides towards enhancing information accessibility, there is an evident need for more targeted interventions to address specific challenges related to the digital divide, language barriers and catering for individuals with disabilities as indicated by the substantial 62.5% facing these issues according to Fig 6. Thus, the evolution of emerging technology has profoundly transformed information accessibility, offering new opportunities to access, share, and utilise information. However, challenges such as barriers to adoption and digital inequalities must be addressed to ensure that the benefits of emerging technologies are accessible to all.

3.4 The Development and Implementation of Emerging Technologies to Enhance Information Accessibility

This section discusses and answers the second research question and objective of the study indicating how the principles of user-centred design be effectively applied in the development and implementation of emerging technologies to enhance information accessibility.

The exploration of emerging technologies' impact on enhancing information accessibility is a critical area of study in today's digital age. The data from Fig.7 provides valuable insights into this topic, revealing that a significant majority of respondents (75%) believe that the development of user-friendly interfaces, implementation of assistive technologies, and providing language translation services are crucial measures to enhance information accessibility for individuals facing digital divide, language barriers, or disabilities.

In contrast, a slightly lower percentage (62.5%) advocate for increased investment in technology infrastructure. These findings align with the research perspective of Cullen (2001), who asserts that user-friendly interfaces are pivotal in ensuring that information is accessible to a diverse audience.

Furthermore, assistive technologies have been highlighted as essential tools in bridging the digital divide. These technologies cater to the specific needs of individuals with disabilities, ensuring that they can access information seamlessly.

Additionally, language translation services play a significant role in breaking down language barriers. This is supported by Kurniawan (2008), who argued that multilingual support enhances inclusivity and ensures that non-native speakers are not marginalised.

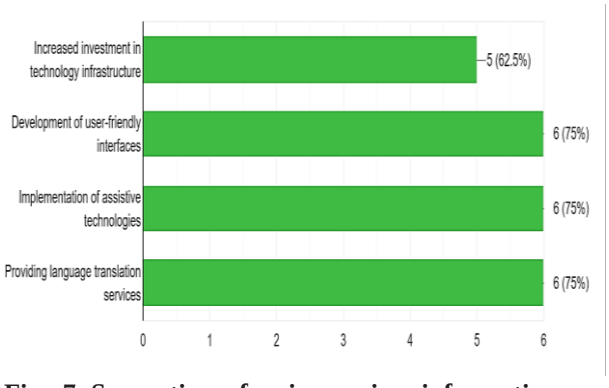

Fig. 7 Suggestions for improving information accessibility through the development and implementation of emerging technologies

However, the integration of these measures requires a holistic approach involving policy formulation and implementation geared towards inclusivity and diversity. Increased investment in technology infrastructure is fundamental as it lays the

foundation upon which these other measures can be effectively implemented.

In sum, the development and implementation of emerging technologies to enhance information accessibility is a multifaceted process that requires a comprehensive approach. It involves not only the development of user-friendly interfaces and assistive technologies but also the provision of language translation services and increased investment in technology infrastructure.

4. Conclusions and Recommendations

The impact of emerging technologies on information accessibility is profound, encompassing a rich tapestry of historical perspectives, technological evolution, and theoretical frameworks. Throughout history, access to information has undergone significant transformations, from ancient oral traditions and cave paintings to the digital age of today. Key milestones, such as Johannes Gutenberg's invention of the printing press, democratised access to information, leading to increased literacy rates and knowledge sharing. Additionally, advancements in library science and the transition to digital libraries further expanded access to information, marking pivotal moments in the evolution of information accessibility.

In the realm of communication, telecommunication networks, including the telegraph, telephone, and computer networks, revolutionised the exchange of information, facilitating real-time communication across vast distances. The advent of the internet and digital technologies in the modern era has further accelerated this transformation, democratising access to information and breaking down geographical barriers. Wi-Fi technology, in particular, has emerged as a cornerstone of modern connectivity, enabling seamless access to information across various devices. Moreover, the rollout of 5G networks represents the next frontier in wireless communication, offering faster speeds and lower latency, thus revolutionising information accessibility by enabling real-time data transmission and supporting emerging technologies like IoT and AI.

However, despite the promise of emerging technologies to enhance information accessibility, barriers to adoption persist. Factors such as cost, infrastructure limitations, and regulatory challenges continue to hinder the widespread deployment of new technologies, posing challenges to equitable access. In the education sector, digital technologies play a crucial role in enhancing information accessibility, yet disparities in access and digital skills can exacerbate inequalities. Moreover, emerging technologies like AI and NLP hold promise for further enhancing information accessibility through innovative applications, such as personalised learning experiences and assistive technologies for individuals with disabilities.

The Diffusion of Innovations theory provides a comprehensive framework for understanding the adoption and dissemination of emerging technologies, shedding light on factors that influence the adoption process.

The study employed a quantitative research approach, utilising structured surveys to systematically probe the ramifications of emerging technologies on enhancing information accessibility. Through rigorous data analysis, the study aimed to extract meaningful insights into the nexus between emerging technologies and information accessibility enhancement. Ethical considerations, such as informed consent and confidentiality protocols, were paramount throughout the research process to safeguard the validity and reliability of the findings.

While the results of the study showcased significant improvements in information accessibility, challenges such as the digital divide and regulatory barriers underscored the need for concerted efforts to ensure equitable access to emerging technologies and their benefits.

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Authors

Yaw Ofori is a Senior Assistant Librarian at the University of Mines and Technology, Tarkwa, Ghana with a wide range of experience in the library profession. He holds M.A Degree in Library Studies and B.A Degree in Information Studies, both obtained from the University of Ghana. He is a member of the Ghana Library Association. His research interests include providing information for employee safety in mining companies, collection development in libraries and application of technology in information delivery.

Beatrice Arthur is a Senior Assistant Librarian at the Kwame Nkrumah University of Science and Technology, Kumasi, Ghana with a considerable experience in the library profession. She holds PhD in Information Science from the University of south Africa, M.A Degree in Library Studies from the University of Ghana. She is a member of the Ghana Library Association (GLA). Her research areas include research data management, social media and information literacy.