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Advancing Digital and Technology Literacy through Qualitative Studies to Bridging the Skills Gap in the Digital Age

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Abstract
The digital age has transformed the way individuals live, work, and interact, with innovations like artificial intelligence, cloud computing, and the Internet of Things (IoT) reshaping industries and societies. This study examines the key obstacles to improving digital and technology literacy and proposes strategies to bridge this gap. The research focuses on developing economies, where socio-economic, infrastructural, and educational barriers exacerbate the digital divide. Employing a qualitative literature review, the study analyzes peer-reviewed articles, reports, and case studies to identify the main challenges and successful interventions in promoting digital literacy. The novelty of this research lies in its contextual focus on developing economies, its multi-sectoral approach involving public and private collaboration, and its emphasis on tailored, lifelong learning programs. By integrating case studies and a thematic analysis of current initiatives, this study provides actionable recommendations for advancing digital and technology literacy, enabling individuals and organizations to fully participate in an increasingly digital world. Advancing digital and technology literacy is vital for closing the skills gap in today's digital age. Despite numerous initiatives, challenges such as limited access, resistance to change, and inadequate educational programs persist. Holistic, multi-sectoral approaches are necessary to create meaningful improvements in literacy rates, contributing to social mobility and economic development. Future studies could use a quantitative approach to measure the impact of specific interventions on digital literacy. Longitudinal research could track the effectiveness of ongoing programs in different socioeconomic settings.

Keywords: Digital Literacy, Technology Literacy, Digital Divide, Developing Economies, Lifelong Learning
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1.0 INTRODUCTION

The digital age has ushered in unprecedented access to information, communication, and automation, transforming the way individuals live, work, and interact. Technological innovations such as artificial intelligence, machine learning, cloud computing, and the Internet of Things (IoT) have not only driven industrial growth but also reshaped entire sectors, from healthcare and education to finance and entertainment (Rashid & Kausik, 2024). However, while these advancements offer tremendous potential (Nyoto et al., 2023), the lack of widespread digital and technological literacy prevents many individuals and organizations from fully leveraging these opportunities (Junaedi, Renaldo, et al., 2023; Junaedi, Panjaitan, et al., 2024). In many cases, people are unable to navigate digital platforms, use digital tools for productive work, or engage with emerging technologies, resulting in missed opportunities for career development, business growth, and personal empowerment.

This digital divide is particularly pronounced in developing economies, where access to technology and the internet may be limited by infrastructure, affordability, or educational barriers (Cahyanto et al., 2023). In such contexts, individuals lacking basic digital skills are often marginalized in the job market (Chandra et al., 2018), as employers increasingly prioritize candidates proficient in digital tools (Afzal et al., 2023). Moreover, digital illiteracy contributes to social inequality, as those without the necessary skills may struggle to participate in civic activities, access essential services, or engage in digital economies. Beyond personal impact, organizations that do not invest in advancing digital literacy face reduced productivity, inefficiencies, and competitive disadvantages.

To address this gap, it is crucial to identify and address the root causes of low digital literacy, including inadequate educational systems, limited access to technology, socio-economic barriers, and resistance to

adopting new technologies due to fear or lack of understanding. Through targeted educational programs, policy interventions, and collaborations between the public and private sectors, we can advance digital and technological literacy, empowering individuals and organizations to thrive in an increasingly digital world. This study aims to explore these issues in depth and propose actionable strategies that can bridge the literacy gap, particularly in under-resourced regions.

Research problem of this study is lack of digital and technology literacy is slowing down digital transformation. Research question of this study is "What are the key barriers to improving digital and technology literacy, and how can they be overcome?"

The novelty of this research lies in its focused examination of the digital and technological literacy gap through a multi-dimensional lens and the identification of tailored strategies to address this gap, particularly in the context of developing economies. Several key aspects highlight the uniqueness of this study:

1. Contextual Focus on Developing Economies: While much of the existing literature focuses on digital literacy in developed countries, this research prioritizes developing economies where the digital divide is more pronounced. The study offers a fresh perspective by examining the unique socio-economic, educational, and infrastructural challenges that limit digital literacy in these regions.
2. Multi-Sectoral Approach: The research introduces a holistic strategy that combines efforts from the public sector, private corporations, and educational institutions to advance digital literacy. It acknowledges the role of corporate social responsibility (CSR), government policy, and educational reform, proposing collaborative solutions rather than isolated interventions.
3. Customization of Digital Literacy Programs: This study emphasizes the need for tailored digital literacy programs that account for cultural contexts, demographic variations, and local resources, making the case for customized training rather than one-size-fits-all approaches. The research suggests models for localized digital training programs based on community-specific needs and technological relevance.
4. Focus on Lifelong Learning: Unlike many studies that focus on initial digital literacy, this research introduces the idea of promoting continuous, lifelong digital education, acknowledging that technological advancements require people to continuously update their skills. This forward-looking approach addresses the rapidly evolving nature of digital tools and ensures that individuals and organizations remain competitive.
5. Integration of Advanced Technologies: As emerging technologies such as AI, IoT, and machine learning become increasingly important, this study uniquely explores how advancing literacy in these specific areas can enhance productivity, economic inclusion, and social participation, beyond the basics of digital literacy.

2.0 LITERATURE REVIEW

Digital Literacy

Digital literacy refers to the ability to effectively use digital tools, technologies, and platforms to access, manage, evaluate, create, and communicate information (Deschênes, 2024). It encompasses a broad range of skills, from basic technical abilities, such as navigating the internet and using digital devices, to more advanced competencies like data analysis, content creation, cybersecurity, and understanding the ethical implications of digital interactions. Digital literacy is a key component in modern education, employment, and civic participation, as it enables individuals to engage with the digital world in a safe, responsible, and productive manner.

Key Components of Digital Literacy:

1. Technical Proficiency: Basic skills to operate computers, smartphones, tablets, and other digital devices. This includes knowledge of software applications, internet browsing, and handling digital files.
2. Information Literacy: The ability to locate, evaluate, and use information effectively. This involves critical thinking and problem-solving skills to assess the credibility of online sources and avoid misinformation.
3. Communication and Collaboration: Using digital tools to communicate (e.g., email, social media, video conferencing) and collaborate on tasks. This also includes an understanding of digital etiquette and the dynamics of online interaction.
4. Digital Content Creation: The capacity to create, edit, and publish content using digital tools. This can include writing blogs, creating videos, designing graphics, or coding websites (Pu Renaldo, Purnama, et al., 2024).
5. Safety and Security: Knowledge of online privacy, digital security, and responsible use of technology. This involves understanding how to protect personal information, avoid scams, and use strong passwords.
6. Problem-Solving and Critical Thinking: Applying technology to solve everyday challenges, whether for personal, educational, or professional purposes. This includes troubleshooting technical issues and making informed decisions about technology use.
7. Adaptability: As technology evolves, digital literacy requires the ability to learn new tools and platforms quickly. This involves a mindset of continuous learning and adaptation to new digital environments.

Importance of Digital Literacy:

1. Workplace Competence: Most jobs now require a baseline of digital literacy, making it essential for career development and employment opportunities.
2. Education: Digital literacy enhances learning by providing students access to vast resources and fostering skills needed for research, collaboration, and creativity.

3. Civic Engagement: Understanding digital platforms enables individuals to participate in online communities, access government services, and engage in digital activism.
4. Social Inclusion: Digital literacy helps bridge social and economic divides, offering individuals greater opportunities to connect, learn, and contribute to society.

Technology Literacy

Technology literacy refers to the ability to effectively understand, use, manage, and evaluate technology in a way that enhances learning, productivity, problem-solving, and communication. It goes beyond merely knowing how to operate devices, focusing on the comprehension of the broader role of technology in society and how it can be applied across various fields. Technology literacy is critical in today's world, where nearly every aspect of daily life, work, and education is influenced by technological advancements.

Key Components of Technology Literacy:

1. Technical Skills: The ability to operate and troubleshoot various types of technology, such as computers, smartphones, software applications, and other devices. This includes knowledge of how to use basic office tools, programming languages, or specialized equipment.
2. Understanding Technology Systems: A deeper awareness of how technology systems work, including networks, cloud computing, databases, and the internet. This involves recognizing how these systems interconnect and their impact on businesses, education, healthcare, and personal life.
3. Problem-Solving and Innovation: The ability to apply technology to solve complex problems creatively and efficiently (Chandra et al., 2024; Junaedi, Sudarno, et al., 2023). This may involve using data analytics, automation, or other technological tools to optimize processes or develop new solutions.
4. Critical Thinking and Ethical Awareness: Understanding the social, legal, and ethical implications of technology use. This includes awareness of data privacy issues, cybersecurity threats, digital citizenship, and the environmental impact of technology.
5. Adaptability to Emerging Technologies: The capacity to learn and adapt to new and evolving technologies such as artificial intelligence, virtual reality, blockchain, and the Internet of Things (IoT). Technology literacy involves staying up-to-date with technological trends and being able to integrate new tools into everyday tasks or workflows.
6. Technology Evaluation: The skill to assess different types of technology, determining which is most effective for specific needs. This includes comparing hardware and software solutions, understanding cost-benefit analyses, and recognizing potential risks.

Importance of Technology Literacy:

1. Workforce Readiness: Nearly all modern industries rely on technology, and technology literacy is essential for employability and career growth. Those proficient in technology are better positioned to contribute to innovation and productivity.
2. Enhanced Learning and Education: Technology literacy in education enables students and educators to engage with new tools, digital resources, and interactive platforms that enhance learning outcomes and encourage lifelong learning.
3. Digital Inclusion: Technology literacy ensures that individuals are not excluded from participating in the digital economy, accessing information, or benefiting from digital services such as e-government, healthcare, and online banking.
4. Empowerment and Independence: Knowing how to use technology effectively helps individuals gain autonomy, improve their skills, and stay connected in a digital world. It empowers people to access knowledge, resources, and opportunities that improve their quality of life.

The Digital Divide

The digital divide refers to the gap between individuals, communities, and regions that have access to modern information and communication technologies (ICT) and those that do not (Soomro et al., 2020). This disparity affects people's ability to use technology for education, employment, healthcare, communication, and overall social inclusion. The digital divide can be observed at various levels, including access to the internet, the quality of the technology available, and the digital skills required to use such technology effectively. Economic, geographic, and socio-demographic factors play a key role in access to digital tools.

3.0 METHODOLOGY

Research Design

This study employs a qualitative literature review methodology to explore existing research on digital and technology literacy (Creswell & Creswell, 2018; Sekaran & Bougie, 2016). A qualitative literature review is an in-depth analysis and synthesis of existing scholarly work, which involves identifying, selecting, and analyzing relevant literature to develop a comprehensive understanding of the topic (Junaedi, Suhardjo, et al., 2024; Renaldo et al., 2024). The review aims to assess current initiatives (Renaldo et al., 2023), programs, and theoretical models that contribute to improving digital literacy and technology adoption, particularly in developing economies.

Data Collection

Gathering relevant peer-reviewed articles, reports, and case studies from databases like Google Scholar, Scopus, and IEEE Xplore. Google Scholar is an easily accessible and widely used academic search engine. It provides a broad range of peer-reviewed journal articles, conference papers, theses, books, and patents across various disciplines. The search focuses on terms such as "digital literacy," "technology literacy," "digital divide," "technology acceptance," "education and training programs for digital skills," and "digital citizenship." Offers a wide array of sources from multidisciplinary research, making it particularly useful for exploring cross-cutting topics like technology adoption and literacy across education (Mamonto et al., 2023), economics, and society.

Scopus is one of the largest abstract and citation databases, offering peer-reviewed literature across scientific, technical, medical, and social sciences fields. Searches are conducted for keywords including "digital literacy programs," "technology acceptance models," "impact of digital literacy on employment," and "strategies for bridging the digital divide." Provides highly credible, indexed articles with access to citation data, allowing for a deeper analysis of the impact of key studies in the field. Scopus also provides analytics on trends and emerging topics.

IEEE Xplore is a highly respected resource for accessing technical literature in electrical engineering, computer science, and information technology. Specific attention is given to case studies and reports on digital literacy initiatives, technology implementation in education, and emerging technologies influencing digital skills training. Essential for understanding the technological dimensions of digital literacy, particularly in terms of hardware, software, and infrastructure that facilitate learning and adoption.

In addition to the main databases, specialized journals and government reports on education, labor markets, and social inclusion (e.g., OECD, UNESCO) are also considered to ensure coverage of policy-driven initiatives related to digital literacy.

Inclusion Criteria

To maintain relevance and incorporate the most up-to-date findings, this study focuses on peer-reviewed articles, reports, and case studies published within the last 10 years (2013-2023). The primary focus is on digital and technology literacy initiatives, particularly in educational and vocational settings, where these skills are increasingly critical for academic success and employability.

Data Analysis

In this study, thematic analysis is conducted to identify recurring barriers and successful strategies for advancing digital and technology literacy (Naeem et al., 2023). Thematic analysis is a method for systematically identifying, organizing, and interpreting patterns (themes) within data. By reviewing literature on digital and technology literacy programs, the study categorizes key barriers and successful strategies into distinct themes.

Contextual Study

To enrich the analysis and provide a broader understanding of digital and technology literacy initiatives, this study incorporates case studies from various sectors and countries. These case studies showcase diverse approaches to enhancing digital literacy and highlight the unique challenges and successes encountered in different contexts.

4.0 RESULTS AND DISCUSSION

Results

From the literature, common barriers to digital literacy include:

1. Lack of Infrastructure: Limited access to the internet and digital devices.
2. Socioeconomic Barriers: Economic disparities in access to learning opportunities.
3. Cultural Resistance: Hesitancy in embracing technology due to lack of trust or understanding.
4. Inadequate Education Systems: Insufficient focus on digital literacy in formal education.

Effective strategies include:

1. Policy Interventions: Government-led initiatives to increase digital infrastructure and affordable access.
2. Customized Learning Programs: Tailored approaches that meet the needs of specific demographic groups.
3. Collaboration with the Private Sector: Leveraging corporate social responsibility (CSR) programs to enhance training opportunities.

Discussion

Impact of Digital Literacy

Impact of Digital Literacy on Employment:

1. Access to Opportunities. Digital literacy is crucial for gaining access to modern employment opportunities. Most job listings, applications, and hiring processes are now conducted online, requiring a basic level of digital competence. Digitally literate individuals can better navigate job portals, create professional resumes, and leverage LinkedIn and other platforms for networking and career growth (Santos & Gomes, 2023).

2. Increased Productivity and Efficiency. Employees with digital skills can utilize tools such as project management software, data analysis programs, and cloud-based collaboration platforms. This not only improves productivity but also enhances innovation within the workforce. Companies increasingly seek employees proficient in digital tools as it leads to cost efficiency and the ability to adapt to a rapidly changing work environment (Kamalakannan, 2024).
3. Opportunities for Remote Work. The rise of remote and hybrid work models requires employees to be proficient in digital communication tools like Zoom, Microsoft Teams, and Slack, as well as file-sharing platforms such as Google Drive and Dropbox (Tjahjana et al., 2024). Digital literacy is essential for individuals to work effectively in virtual teams, making it a key factor in the growing remote work trend (Barrero et al., 2014).
4. Pathways to New Careers. Advancing digital skills opens up new career paths in technology-driven fields, such as digital marketing, data analytics, artificial intelligence (AI), and software development. This creates job opportunities in industries that are emerging as a result of digital transformation (Kraus et al., 2022).
5. Digital Entrepreneurship. Digital literacy enables individuals to start and run online businesses. With knowledge of e-commerce platforms, digital payment systems, and online marketing tools, aspiring entrepreneurs can reach global markets with minimal upfront investment. This fosters innovation and economic growth, especially in developing regions (Bastomi et al., 2023).

Impact of Digital Literacy on Social Inclusion:

1. Bridging the Digital Divide. Digital literacy is a vital tool for bridging the digital divide, ensuring that marginalized or underserved populations can access vital information and services. This includes everything from government assistance programs to telemedicine and educational resources. Improved digital skills help combat exclusion based on socioeconomic, geographical, and educational disparities (Puspita, 2024).
2. Access to Education. Individuals with digital literacy can access online learning platforms, free educational content, and e-learning courses. This opens up lifelong learning opportunities for everyone, regardless of location or financial background. Online courses from institutions like Coursera, edX, and Khan Academy are democratizing education, making it possible for people to gain new skills and knowledge at their own pace (Ervianti et al., 2023).
3. Strengthening Community Connections. Digital platforms allow individuals to engage in social networks, stay connected with friends and family, and participate in community events. Social media, messaging apps, and online forums help foster a sense of belonging and participation in a wider community, which is particularly important for vulnerable or isolated populations (Cagatin, 2024).
4. Access to Health and Government Services. Digital literacy empowers individuals to navigate telemedicine services, access health information, and use government services available online, such as applying for benefits, taxes, and legal documentation. This inclusion in essential services reduces barriers for people in remote or disadvantaged regions (Fitzpatrick, 2023).
5. Civic Participation. Digital literacy enhances social inclusion by promoting active civic engagement. Individuals can participate in discussions about social and political issues, sign petitions, and contribute to online campaigns. Access to digital platforms allows for greater engagement with local and national government decisions, promoting inclusivity in the democratic process (Tarsidi et al., 2023).

Impact of Digital Literacy on Digital Citizenship:

1. Informed Decision-Making. Digital literacy is critical for becoming an informed digital citizen (Putra, Renaldo, Junaedi, et al., 2024). It involves the ability to critically assess information, evaluate sources for credibility, and avoid misinformation. In an age of rampant fake news, digital citizens must understand how to engage responsibly with content on social media and the web (Fonseca & Borges-Tiago, 2024; Renaldo et al., 2021).
2. Responsible and Ethical Online Behavior. A digitally literate citizen understands digital ethics, including the importance of privacy, intellectual property, and the responsible use of digital resources. This includes being aware of the legal and ethical ramifications of sharing personal data, downloading copyrighted material, and participating in online behavior that could harm others (Sari et al., 2024).
3. Cybersecurity Awareness. Digital literacy helps individuals recognize cybersecurity threats, such as phishing scams, malware, and data breaches. By learning how to create strong passwords, recognize suspicious activities, and secure their digital presence, individuals can protect themselves and others in the digital space. A knowledgeable digital citizen also understands the importance of safeguarding personal data (Admass et al., 2024).
4. Advocacy and Activism. Digital literacy allows people to become active participants in societal change through online activism. From organizing social movements to raising awareness about human rights or environmental issues, digital platforms provide citizens with powerful tools for global advocacy (Renaldo, Junaedi, et al., 2022; Tanjung et al., 2023). Well-informed digital citizens can leverage these platforms to promote positive change (Karki, 2023).
5. Inclusivity in Governance. Governments are increasingly relying on digital platforms for engaging with citizens, offering services, and soliciting feedback on public policy. Digital literacy enables citizens to access these services, participate in e-government initiatives, and engage in policy dialogues. This enhances inclusivity in the decision-making processes of governance (Renaldo, Suhardjo, et al., 2022; Yuan et al., 2023).

Education and Training Programs

Digital literacy education and training programs have emerged globally to address the growing need for digital skills across all sectors of society. These initiatives aim to equip individuals with the knowledge and competencies required to navigate and succeed in a digitally-driven world. Below are some of the key digital literacy initiatives and their effectiveness in improving knowledge and skills:

1. Global Digital Literacy Initiatives
   a. Digital Skills for Jobs Coalition (European Union)
      The European Commission's Digital Skills for Jobs Coalition is a major initiative aimed at improving digital literacy across the EU. This program targets diverse groups, including the unemployed, students, teachers, and workers, providing resources to enhance digital skills in line with labor market demands.
      Effectiveness:
      The coalition has been successful in bridging the skills gap in many EU countries by offering training for high-demand digital competencies such as coding, data analysis, and cloud computing. It has trained over 10 million citizens since its launch, helping to reduce digital skill gaps among various population segments, particularly youth and senior citizens. The initiative emphasizes collaboration between governments, businesses, and educational institutions, resulting in scalable training programs across sectors.
   b. Grow with Google (Global)
      Grow with Google is an initiative designed to provide digital skills training and certifications. It focuses on improving access to job-ready skills, offering free online courses in areas such as digital marketing, data analytics, IT support, and project management. Google collaborates with non-profit organizations and educational institutions to reach underserved communities.
      Effectiveness:
      The program has proven highly effective in improving digital literacy, especially in developing regions and underrepresented groups. By offering free and accessible training, it has helped thousands of individuals gain certifications that lead to new job opportunities. The initiative's focus on practical, industry-aligned skills makes it a strong resource for individuals seeking employment in the digital economy.
   c. Microsoft Digital Skills Initiative (Global)
      Microsoft's Digital Skills Initiative aims to empower people with essential digital skills, focusing on improving access to technical education, especially in underserved communities. The program offers learning pathways in coding, cloud computing, artificial intelligence (AI), and cybersecurity, as well as resources for teachers and students.
      Effectiveness:
      This initiative has been particularly effective in providing comprehensive digital skills training to underserved communities globally. The partnership with LinkedIn Learning, where learners can access a wide variety of technical courses, has been instrumental in creating job-ready professionals. Microsoft's initiative is credited with helping millions of individuals transition to new career opportunities in technology-focused roles.
2. National-Level Digital Literacy Programs
   a. Digital India Initiative (India)
      The Digital India Initiative is a government-led program aimed at transforming India into a digitally empowered society. The Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA) is one of its sub-programs focused on promoting digital literacy in rural areas. It provides basic training in using computers, smartphones, and the internet, targeting citizens who lack formal education (Sevendy et al., 2023).
      Effectiveness:
      This program has significantly improved digital literacy among rural populations in India, where access to digital technology was previously limited. The initiative has trained over 40 million individuals, enabling them to access government services, banking, and educational resources online. However, challenges remain in scaling the program and ensuring long-term digital engagement, particularly in areas with infrastructure deficits.
   b. Be Internet Citizens (UK)
      Be Internet Citizens is a UK-based initiative supported by Google, which focuses on teaching digital literacy, media literacy, and online safety to teenagers. It addresses critical issues such as misinformation, online privacy, and responsible internet use.
      Effectiveness:
      This program has been effective in raising awareness of critical digital literacy issues, particularly among younger generations. It has helped improve critical thinking skills, equipping students with the ability to analyze online content and avoid misinformation. However, its impact is primarily limited to urban areas, with rural access still a concern.
3. Community and Grassroots Initiatives
   a. Coding for Kids Initiatives (Global)
      Several non-profit organizations and private companies have launched Coding for Kids programs aimed at teaching young students basic coding skills. Initiatives like Code.org and Scratch focus on early digital education by making coding fun and accessible to children through games, puzzles, and projects.

Effectiveness:
These programs have shown tremendous success in promoting digital literacy among children and teenagers. They not only enhance coding and computational thinking skills but also help foster creativity and problem-solving. By integrating coding into early education, these programs prepare younger generations for future careers in technology and innovation (Renaldo & Murwaningsari, 2023).

b. Community Tech Hubs (Various Countries)
In many developing countries, community tech hubs have been established to provide free or low-cost digital literacy training to local communities. These hubs are often supported by non-profit organizations or private companies and serve as centers for digital education, entrepreneurship, and innovation.
Effectiveness:
Tech hubs have been effective in providing digital skills to underserved communities, particularly in regions where access to education and technology is limited. They offer hands-on training in various areas, such as digital marketing, coding, and basic computer literacy. Many participants have gone on to start small businesses or secure employment through the skills gained at these hubs.

4. Corporate Initiatives
   a. IBM SkillsBuild (Global)
   IBM's SkillsBuild initiative provides free access to online learning modules focused on in-demand technology skills such as cybersecurity, AI, and data science. The program also offers mentoring, internships, and employment support to help participants transition into the workforce.
   Effectiveness:
   The program has been effective in preparing individuals for technology-driven roles by offering industry-relevant training. It has particularly benefited career-switchers and individuals from underrepresented groups in the tech industry, offering pathways into new employment opportunities. The inclusion of mentorship and career support also enhances the practical value of the program.

Technology Acceptance Models

The Technology Acceptance Model (TAM), introduced by Davis (1989), provides a foundational framework to understand how individuals adopt and use new technology. TAM posits that two key factors influence individuals' decisions to embrace new technologies: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). These factors, shaped by attitudes and external variables, play a critical role in the acceptance of digital tools in both personal and professional contexts. Over the years, TAM has been extended and adapted to include various factors affecting technology adoption, making it highly relevant in advancing digital literacy.

1. Perceived Usefulness (PU)
   Perceived usefulness refers to the degree to which a person believes that using a particular technology will improve their job performance (Zulkifli et al., 2023) or quality of life. In the context of digital literacy programs, individuals are more likely to adopt digital tools if they perceive them as beneficial to their daily tasks, such as work, education, or social interaction (Bancoro, 2024).
   Impact on Learning: If learners believe that digital tools will make tasks easier, faster, or more effective, they are more likely to engage with them. For example, students may be more inclined to use online learning platforms if they perceive that the technology will help them achieve better academic outcomes.
   Impact on Adoption: For employees, the perceived usefulness of digital tools can enhance job performance, making them more likely to adopt new technologies in their work. Tools like cloud computing, data analysis software, and digital communication platforms become more readily accepted if individuals see tangible benefits in terms of productivity and efficiency.
2. Perceived Ease of Use (PEOU)
   Perceived ease of use refers to the extent to which an individual believes that using a particular technology will be free of effort. If individuals feel that a digital tool is easy to use, they are more likely to adopt and integrate it into their routine (He et al., 2018).
   Impact on Learning: A lack of technical skills or fear of complexity can be a significant barrier to digital literacy. If users perceive digital tools as overly complex or difficult to navigate, they may avoid learning them, leading to low adoption rates. This is particularly relevant for older adults or those with limited prior exposure to technology.
   Impact on Adoption: The simpler and more user-friendly a digital tool is, the more likely individuals are to adopt it. Intuitive interfaces, straightforward tutorials, and built-in support features can help reduce the cognitive load required to learn and use new technologies, encouraging broader adoption.
3. Attitudes Toward Technology
   Attitudes toward technology significantly influence an individual's willingness to learn and adopt digital tools. These attitudes are shaped by prior experiences, social influences, and perceived cultural norms regarding technology use (Ly et al., 2024).
   Positive Attitudes: Individuals who hold positive attitudes toward technology are more open to experimenting with new digital tools. They are likely to see technology as an enabler of personal and professional growth, making them more proactive in acquiring digital skills.

Negative Attitudes: Conversely, individuals with negative attitudes may resist digital tools, often due to a lack of confidence, fear of failure, or skepticism about the usefulness of technology. Addressing these attitudes through targeted digital literacy programs is essential to ensure broader adoption.

4. Social Influence and Subjective Norms
   The extended TAM (TAM2 and TAM3) includes the role of subjective norms—the social pressure an individual feels to use a certain technology. Social influence from peers, family, or colleagues can impact an individual's attitude toward adopting digital tools (Wilson & Prayitno, 2022).
   Impact on Learning: In educational settings, social influences from teachers, classmates, or mentors can positively impact students' willingness to engage with digital tools. Similarly, within organizations, management support and peer encouragement can foster a more positive learning environment for new technologies.
   Impact on Adoption: Social influence is particularly strong in the workplace, where pressure to adopt digital tools from colleagues or supervisors may lead to quicker acceptance of new technology. Training sessions, workshops, and digital literacy campaigns that emphasize collective adoption tend to yield higher success rates.
5. Facilitating Conditions
   Facilitating conditions refer to the technical infrastructure, resources, and support systems that assist individuals in adopting new technology. If individuals have access to adequate training, technical support, and resources, they are more likely to engage with and adopt digital tools (Amnas et al., 2023).
   Impact on Learning: Inadequate resources such as poor internet access, lack of technical support, or limited access to devices can hinder learning. Facilitating conditions, such as the availability of free online courses, tutorials, and troubleshooting assistance, are essential for promoting digital literacy.
   Impact on Adoption: Workplaces that provide the necessary infrastructure, such as updated software, user-friendly devices, and ongoing IT support, see higher levels of technology adoption. Similarly, educational institutions that provide digital literacy programs and access to tools like tablets, e-learning platforms, and software licenses encourage students to engage more deeply with technology.
6. Behavioral Intentions to Use Technology
   TAM concludes that behavioral intention—the strength of an individual's intention to use a technology—is a direct predictor of actual technology use. This intention is influenced by PU, PEOU, attitudes, and facilitating conditions (Liao et al., 2018).
   Impact on Learning: In digital literacy training, fostering strong behavioral intentions is crucial for success. Digital literacy programs need to focus on creating positive experiences that build users' confidence in their ability to use technology effectively. Hands-on learning, success stories, and practical demonstrations can help learners form strong behavioral intentions.
   Impact on Adoption: Organizations that cultivate a culture of continuous learning and innovation, where digital tools are regularly adopted and improved upon, tend to reinforce behavioral intentions (Junaedi, Renaldo, et al., 2024). Clear communication of the benefits and ease of use, along with supportive learning environments, strengthens the intention to adopt new technologies.

5.0 CONCLUSION

Conclusion

Advancing digital and technology literacy is vital for closing the skills gap in today's digital age. Despite numerous initiatives, challenges such as limited access, resistance to change, and inadequate educational programs persist. Holistic, multi-sectoral approaches are necessary to create meaningful improvements in literacy rates, contributing to social mobility and economic development.

The impact of digital literacy spans across various dimensions, including employment, social inclusion, and digital citizenship. It is essential for individuals to develop digital skills not only to succeed in the job market but also to participate fully in society. Education and training programs play a pivotal role in enhancing digital literacy, making it a crucial focus for governments, organizations, and communities worldwide.

Furthermore, understanding the factors that influence technology adoption, such as perceived usefulness, ease of use, and social influences, can help tailor digital literacy initiatives to meet the needs of different populations effectively. By fostering digital literacy, we can create a more inclusive society where everyone has the opportunity to thrive in a digital world.

Implication

The research has implications for policymakers, educators, and industry leaders in shaping effective digital literacy programs. Increased literacy will enhance workforce readiness and reduce digital inequality.

Limitation

This study is limited by its qualitative nature, which focuses on primary data. The findings may not account for the most recent shifts in technology or policy changes post-pandemic.

Recommendation

Recommendations that can be given include:

1. Expand Access to Technology: Governments should prioritize affordable internet and device access, especially in rural areas.
2. Develop Tailored Educational Programs: Schools and vocational institutions should incorporate digital literacy into their curricula at every level.
3. Encourage Lifelong Learning: Promote continuous digital skill development to keep up with rapidly evolving technology.

Future Research

Future studies could use a quantitative approach to measure the impact of specific interventions on digital literacy. Longitudinal research could track the effectiveness of ongoing programs in different socioeconomic settings.

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