

The Impact of Digital Literacy on Social Inequality in Rural India: Bridging the Digital Divide for Inclusive Development

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Abstract- In rural India, where digital technology and skills remain limited, the widening digital divide fuels existing social inequalities, with digital literacy emerging as key to bridging gaps in economic opportunities, education, health care, and social services, yet despite government efforts to digitize rural sectors through initiatives such as the Digital India campaign, millions of rural dwellers, especially women, the old and cultures, remain unable to gain digital skills as infrastructure deficits, socio-economic factors, gendered inequalities and exorbitant technology costs prevent them from participating fully in the digital economy and society; this research examines how the shortfall in digital literacy in rural Indian communities exacerbates social inequality by hindering access to better job opportunities, economic mobility, quality formal education, as well as critical services like telemedicine and e-governance, focusing particularly on how marginalized communities experience these issues in varied ways based on their gender, caste and socio-economic status, and how digital literacy can be a tool of power to ameliorate disparities through equipping rural populations with the skills necessary to access online learning platforms and opportunities, skilling centres, remote work, e-commerce as well as digital finance, thus enabling them to properly engage in India's growingly digitalized economy; by reviewing existing literature, government documents, case examples and digital literacy programming success stories, this paper offers a thorough framework for comprehension the impediments to digital literacy in rural India, pointing the necessity for attainable policies and targeted actions that facilitate accessible, affordable, and cross-gender both sensitive, digital literacy initiatives focused toward empowering rural communities, particularly inclusive towards women and marginalized groups, as well as providing

suggestions towards policy for progressing digital infrastructure, diminishing the prices of digital gadgets and internet access, and developing learning systems adjusted to these populations, with the ultimate goal of stimulating a more inclusive, fairer, and digitally empowered rural India through the technology serving as one of the instruments for lowering social inequality along with promoting inclusive development.

Keywords: Digital Literacy, Social Inequality, Rural India, Digital Divide, Inclusive Development, Marginalized Communities

I. INTRODUCTION

Digital literacy has become increasingly vital in facilitating social inclusion and addressing economic development disparities in rural India in recent years. This is because technology is not as widely adopted in India's villages, and the digital gap between rural and urban India is becoming more pronounced. Digital literacy is no longer a prerogative of the elite in India's cities. Rather, it has emerged as a vital tool for participation in the modern economy, obtaining education, accessing healthcare services, and government benefits, among other areas, especially for underprivileged populations such as women, the elderly, and people with low socioeconomic status. As India becomes more digitally driven, the lack of digital literacy becomes more severe, especially as government schemes and other private firms implement programs aimed at making India a digitally empowered society. However, over 65% of India's population remains in rural regions, which are underserved in terms of digital literacy. The situation reflects subpar or non-existent digital capabilities, which handicap rural India's ability to participate in the digital economy or benefit from gains in quality of

life, increases in income, and improved social services. Therefore, the problem under investigation in this manuscript can be defined as the digital gap between rural and urban India and the extent to which it exacerbates social inequality by preventing India's rural poor from obtaining education and job-readiness training, improving their health through new digital technologies, and accessing other necessary support services. The objectives of this paper include investigating the relationship between digital literacy and social inequality in rural India, examining how a lack of digital literacy complicates the status quo and hierarchical social systems in these areas, and identifying factors that prevent the obtaining of digital literacy and understanding why many rural Indian residents lack the desire or motivation to adopt new technologies. The study will focus on several key areas of economic opportunity, such as online work and entrepreneurship, and its training requirements, such as the need for digital financial literacy in India, among other topics. The study will also investigate the training requirements for education and their relationship with the healthcare sector, including telemedicine and other aspects. This study's objectives include understanding the socioeconomic and cultural problems facing these individuals, such as gender inequality and the linkage between class status and digital literacy, among others. Finally, identifying various currently utilized programs and the way they operate will enable information to be gathered for one of the manuscript's other objectives: generating suggestions for the design and implementation of future programs in the region. This study's purpose is therefore to contribute to knowledge regarding digital literacy in India and help existing and future programs improve this vital set of services.

II. LITERATURE REVIEW RELATED TO THE STUDY

Specifically in rural India, digital literacy is widely considered the ability to use digital technologies including phones, computers, and the internet in order to search for, critically evaluate, and generate information. This definition separates basic digital skills (sending emails, browsing, using mobile phones for communication) and advanced ones such as coding, developing software or digital entrepreneurship competences which are essential to

participate in the contemporary knowledge economy (Van Dijk, 2012). Basic digital literacy is increasingly important for accessing services and staying connected, in today's world advanced digital skills are key to gaining higher paid employment and engaging in digital entrepreneurship. In rural India, emphasis has traditionally been on rudimentary digital literacy as much of the population lacks basic skills to operate mobile phones or browse the internet (Chakravartty, 2020). Yet as the country transitions towards a more digitalized economy, it is necessary to inculcate even basic and advanced levels of digital literacy so that rural citizens can be educated on all aspects of life specifically designed for comprehensive empowerment and economic mobility. Social inequality in rural India is exercised in different ways such as economic inequality, gender inequality, wide gap between castes and unequal access to basic services (education, healthcare and social services). 40, Issue 2, May-August, 2018 ISSN No: Print :2455-8699, Online :2231-062478 Despite some criticism on redesigning and renewing of NREGA the rural credit is still nontrusted adequately as an end users are found to be poorer there (National Sample Survey Office - NSSO-Sharma; Suhwag, 2018) Approximately two-third of Indian population lives in socially cities that calls limited pockets of poverty where only 30% such persons reside below poverty line due to informal employment opportunities and menial infrastructural support like lay surface for transportation mode despite having acute pace from average agriculture used by every standards. These economic differences are compounded with gender disparities, with women, particularly in villages, facing systemic barriers to education, employment and financial independence (Siddiqui 2003). Women's access to digital tool is also exacerbated by social and cultural norms which reduce their autonomy and mobility, women only access to information (and the digital economy) will ultimately be limited. Caste-based inequities also continue to exist in rural India and disadvantaged groups experience discrimination in education as well as the job market, which are increasingly traversing digital domains (Desai & Vanneman, 2018). Access to quality education and healthcare shortage is still another important dimension of rural inequality, as the population in rural area have limited access to regional facilities offering traditional as well digital educational resources, and have difficulty in accessing

health services because of infrastructural as well economic constraints (UNICEF, 2020). Digital literacy has come to be regarded as an important bridge against social inequality, especially in rural areas since it enhances access to education, health services economic activities and other social services. Studies suggest that digital literacy has the power to transform marginalized communities, especially women and the rural poor of India. With the use of digital tools, students living in rural areas can access online education, affording them opportunities to learn that extend beyond those available at their local schools (Desai & Vanneman, 2018). Telemedicine and other Web-based resources have also played a key role in expanding access to care, as rural areas are often short of medical infrastructure. The telemedicine initiative by the Indian government, e-Sanjeevani and other programs enabled rural communities to consult with doctors through telecommunication bridge [45] (Niti Aayog, 2020). Digital literacy also opens economic opportunities: enabling access to online work, digital marketplaces and financial inclusion via mobile banking and digital payments which break down barriers to economic participation and create new paths for rural entrepreneurs (Bharadwaj 2020). For marginalized groups, including the women, the digital literacy offers financial independence as it can give them an access to microfinance programs and other forms of digital entrepreneurship tools that support gender equality and economic empowerment (Srinivasan, 2021). Even though digital literacy is helping bridge this gap to some extent, there are still obstacles to achieving a state of digital literacy, especially in rural India. One bottleneck is the infrastructure, say rural areas where internet connectivity tends to be poor, and where there are no digital devices like computers and smartphones that people will need to access online platforms. The Telecom Regulatory Authority of India (2020) reports that only 35% of rural India has access to high-speed internet, which greatly hampers digital literacy initiatives there. Even socio-economic conditions also contribute, as many rural families cannot afford the cost of smartphones, data plans and digital gadgets needed for acquiring digital skills (Rao & Patel, 2019). Furthermore, gender inequities are very often the cause that hinder women's access to digital education as women may be bound by cultural demand and lack of family support in rural settings where they live

(Raghuram, 2009). Inadequate educational materials and skilled teachers are exacerbating the problem, with many schools and community education centers in rural areas not having the resources or knowledge to provide digital literacy training (Rao & Patel, 2019). These obstacles sustain the digital divide, in which rural areas do not realize the potential of the digital revolution. There have been multiple efforts in India for digital inclusion to bridge the rural divide and underserved rural areas in order to provide more access to Internet. Launched in 2015, the Digital India program endeavors to shape a digitally empowered society in India by enhancing IT infrastructure, enabling public access to digital services and fostering digital literacy through different initiatives such as PMGDISHA (Pradhan Mantri Gramin Digital Saksharta Abhiyan) intending to make six crore rural households digitally literate by 2024 (Ministry of Electronics and Information Technology, 2020). NGOs such as Digital Empowerment Foundation (DEF) have also been involved in digital literacy and building of digital skills among the rural women, and marginalized communities (DEF, 2020). But they face major barriers: lack of funding, absence of community input, and difficulty in securing plans for the long-term sustainability of digital infrastructure. – However, while successful in some respects, the scalability and sustainability of these programs pose very real challenges (Kumar, 2021). In summary, although digital literacy has the potential to mitigate social inequalities in rural India, the existing infrastructure, socio-economic and gender-related issues need to be tackled for enabling access. To avoid this very real risk, promoting digital inclusion initiatives, enhancing internet connectivity and developing more gender appropriate/culturally sensitive training programmes are critical to ensuring that the development of digital literacy can become an enabling force for reducing social inequality and achieving more inclusive development outcomes in rural India.

III. CONCEPTUAL FRAMEWORK RELATED TO THE STUDY

The way digital literacy influences social inequality in rural India is conceptualized through a model that associates digital literacy with aspects of rural life such as economic activities, education and service delivery—and accounts for how socio-economic

background, gender and regional disparities combine with digital skills to reproduce or mitigate inequality. The framework proposes that digital literacy is a mediator of economic, educational and social opportunities for another population, rural residents which serve to enable their engagement with digital platforms in employment, education and healthcare. In this scenario, digital literacy is more than a mere set of skills, it is the driver of social inclusion which can bring rural populations into the expanding digital economy and society. Theoretical model the theoretical frame-work postulates that individuals with digital literacy have better access to digital platforms such as job websites, Internet businesses and telecommuting which is vital for enhancing income generation in rural areas due to their imitations on traditional labor markets (Bharadwaj, 2020). Moreover, digital literacy creates opportunities for education among those who live in remote areas where finding good schools or universities is difficult since the rural society can access e learning, MOOCs and skill development (Desai & Vanneman 2018). On a similar note, digital facilitates eased access to health services through telemedicine platforms which allows people in rural and remote locations to see doctors' kilometers away, get better diagnosis online rather than incurring long distance travel or cost for simple treatments deserving universal healthcare, treatment and insurance (Niti Aayog 2020). Nevertheless, the model takes account of how socio-economic status, gender and regional differences shape digital literacy and its effects. For instance, socio-economic gaps in terms of poverty, no infrastructure and expensive technology can prevent the access to digital literacy in rural India (Chakravartty 2020). Lack of internet connectivity, Smartphone and data plan cost other than digital literacy are some such barriers commonly faced by many rural areas specifically economically compromised ones (Rao & Patel, 2019). Gender disparities are a major roadblock as well to access, with rural women getting confronted by cultural and social hindrances in terms of mobility and technology. For example, Srinivasan (2021) suggests that gendered unevenness in the accessibility of digital devices and resources is one reason why women are excluded in developing the digital skills required to participate in the economy and to access services, with implications for ongoing gender inequality. In like manner, caste-based divide can escalate social exclusion when

marginalized communities (Dalits and Adivasis) are denied the right to enjoy equal opportunities for participation in digital literacy programmes giving rise to socio- economic disparities (Desai & Vanneman, 2018). There is regional variation as well since digital infrastructure access can be worse in rural regions of some counter examples such as Bihar and Uttar Pradesh compared with states like Maharashtra or Tamil Nadu, where urbanization and digitization efforts have been more advanced (Batra & Sharma, 2020). This regional variation influences the potential role of digital literacy in alleviating social injustice among rural societies. The specific hypotheses or research questions which will guide this research include: What is the role of digital literacy in access to economic opportunities in rural locations? Here, we ask the question whether digital literacy-based skills can possibly lead to alternative sources of income generation, internet entrepreneurship and on-line jobs particularly in remote hinterlands where conventional employment opportunities are meagre (Bharadwaj 2020). How does digital literacy help with education and health in rural areas? It will examine whether digital literacy enhances the availability of remote learning platforms and telemedicine, and whether this translates to improved educational attainment and health in marginalized rural areas (Desai & Vanneman, 2018; Niti Aayog, 2020). What are the obstacles towards digital literacy for marginalized populations such as women, elders, or people belonging to economically disadvantage groups and how can they be lifted? This research question addresses 'the socio-economic, gendered and cultural barriers' to access for marginalized communities to digital literacy programs and solutions they would need to overcome such barriers: 'accessibility of technology at affordable cost', 'Education programmes sensitive on the issue of gender', 'connectivity problems (internet)' (Srinivasan, 2021; Rao & Patel, 2019). Within the concept framework, policies encouraging accessibility, affordability and inclusiveness for a wider range of digital literacy programs will be necessary to ensuring that the benefits potential from digital technology will be fairly distributed across all sectors of the community. This conceptual framework underscores the significance of digital literacy as a facilitator of social integration and economic growth, as well as the necessity for tailored responses that take into account rural communities'

specific sociocultural and infrastructural constraints. The findings from the study will help shape policy intervention that is targeted to enhance digital literacy in rural India so that it acts as an equalizer in reducing social inequalities between different sectors.

IV. METHODOLOGY (CONCEPTUAL APPROACH)

As the study is a conceptual in nature, review and synthesis of literature, theoretical models and other secondary data sources will be the main research methodology to provide a rigorous conceptual justification of digital literacy on social inequality in rural India, focusing specifically on how can digital literacy works as mechanism to bridge the digital gap between advantaged group versus marginalized community group and also what are underlying challenges faced by disadvantaged people for full inclusion towards going need-fulfilment approach through digital government services in rural areas with lack of digital infrastructure (digital divide) access barriers as well as economic barriers And socio-cultural restraints. This will provide a more nuanced understanding of multi-dimensional effects of digital literacy in relation to economic opportunities, education, life-long learning, health and livelihood gains as well as role for reducing gendered barriers in better access to resources such as mobiles and internet in connecting with important social networks and social groupings – given significant homogeneity with regard the effect of increased accessibility facilitated by affordable technology. Secondary data sources including government reports, research papers and case studies will be used to allow a comprehensive conceptual analysis of digital literacy in the context of social inequality. Data sources for the paper will comprise of major government documents such as 'The Census of India,' reports from the Ministry of Electronics and Information Technology, and others state-sponsored digital literacy programmes e.g., Digital India Programme (Ministry of Electronics and Information Technology 2020), with quantitative indication on rural digital infrastructure, internet connectivity, and digital literacy. These reports will also be key to understanding the digital literacy gap between rural and urban communities. Peer-reviewed studies from academic institutions and NGOs will also be considered to learn more about the impact on digital

literacy as a way to empower marginalized groups, particularly in rural areas (UNDP, 2020). Data from successful digital literacy programmes such as the Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA) and group of organizations known as the Digital Empowerment Foundation (DEF) initiatives with rural India (DEF, 2020) will be examined to highlight best practices, challenges, and lessons learned from these interventions in rural areas. Furthermore, the study will use information collected from socio-economic surveys and indicators of impact evaluations of rural digital literacy programs to compare the achievements and limitations of current initiatives and implications for social inequality reduction. Interviews, focus groups, and NGO/development agency reports of field experiences generating qualitative data will provide us with understanding how digital literacy shapes critical thoughts in the lives of rural individuals and communities, particularly underserved populations. The method of analysis will include critically examining the literature related to digital literacy and social inequality in rural India, with an emphasis on synthesizing the evidence from different sources to construct a theoretical model of how acquisition and development of digital skills can impact multiple dimensions (for example: education, health, economic opportunities) in rural life. Such successful programs in the past such as Digital India campaign and e-Sanjeevani (telemedicine) will be also analyzed comparatively to estimate its efficacy for overcoming barriers of rural people, especially infrastructural, gender and socio-economic gaps (Niti Aayog et al., 2020). This work will also explore the policy implications of digital literacy and how government and non-government approaches to addressing the issues that surround rural education from a more equitable footing with urban areas around technology access, including through digital literacy. In the process, the research will pinpoint limitations in current models of digital literacy and ideas for enhancing efficient program delivery and impact. Drawing on theoretical underpinning on existing models such as the digital inclusion framework (Gurstein, 2003) and technology adoption theories (Venkatesh et al., 2003), this study will frame a conceptual view of how digital literacy can act as a transformative tool in addressing social inequality, and encouraging inclusive development. At the same time,

this paper aims to integrate theoretical perspectives on social inequality, economic empowerment and education to examine how digital skills can dismantle conventional barriers to being employed, educated and using social services; and how dimensions of gender, caste and class intersect with the axes of that occur in terms of digital access and inclusion. In sum, the process adopted by the proposal will consist of a systematic review of previous studies on digital literacy in rural India, leveraging quantitative and qualitative knowledge to articulate a theoretical framework that connects digital literacy with the reprisal of social inequality paying special attention to identify barriers for the digital inclusion of vulnerable communities. The findings from this review will help identify gaps in policies and programs that limit the potential of digital literacy in India's rural areas, as well as inform concrete suggestions for how to leverage digital literacy to drive more inclusive development gains among neglected populations.

V. DIGITAL LITERACY AND ITS ROLE IN REDUCING SOCIAL INEQUALITY

Digital literacy can also create and facilitate new economic opportunities for rural Indians, like eCommerce, online work etc., connect them to various government schemes and lead to digital entrepreneurship. As digital platforms become vital to the global and local economies, these entrepreneurs can access online tasks (for example: content writing, freelance writing, data entry, customer service etc.), regardless of where they are located in the world. In the hinterlands where the employability potential is limited, digital literacy can act as a transforming tool by opening up online job markets which were beyond reach of rural (Bharadwaj, 2020). In addition, digital literacy supports e-commerce development, enabling rural entrepreneurs to reach new markets and allow farmers to directly trade their local products anywhere in the national or even international market without going through the traditional supply chains that would otherwise be their scope of activity. Initiatives such as PMGDISHA (Pradhan Mantri Gramin Digital Saksharta Abhiyan), that encourages digital literacy, has been successful in economically empowering the rural population through imparting basic digital skills to these communities and linking them with various digital marketplaces which provide economic

independence - mobile banking services like Pradhan Mantri Jan Dhan Yojana ('Prime Minister's People Money Scheme) and Bharat Interface for Money (Ministry of Electronics and Information Technology, 2020). These projects have focused their efforts on millions of rural people and provide concrete examples of how digital literacy can directly contribute to one's ability to participate in economic opportunities as rural citizens are enabled to access the digital economy, thereby creating new avenues for generating income and participation within the wider economy. Besides the economic opportunity, digital literacy is crucial for educating the residents of rural areas by allowing them to access online educational materials, skill development centers and distance learning solutions. For students in rural areas, who are accustomed to poor schools, missing teachers and a lack of learning materials (including textbooks) digital technology can give access to online learning platforms like SWAYAM1, NPTEL2 (National Programme on Technology Enhanced Learning programs offering free courses from premier universities/institutions3 [Desai & Vanneman 2018]). These platforms help rural students to learn, take up certification courses, and acquire skills that allow them to bridge the education gap between urban & rural people. And digital literacy also allows rural adult to be a part of skill development programs, which may play a significant role in making them (more) employable by providing them vocational training in areas like agriculture technology, mechanical work and digital services (Chakravarty, 2020). Digital tools not only have a role in learning, but also the opportunities they offer can lead to educational independence: self-exploration of resources at their own rate; access to global knowledge bases; working collaboratively with peers from around the globe which will help them academically and more importantly future career prospects. To address healthcare access, digital literacy can make a crucial impact in terms of enhancing telemedicine and accessing online health resources as well as awareness campaigns including rural India where health facilities are scarce or located far off. For example, on digital platforms like e-Sanjeevani (the Indian government telemedicine initiative), rural populations have the capability of distant doctor consultation for quality healthcare without travelling such long distances which are economically and logistically challenging at

times (Niti Aayog, 2020). These telemedicine applications have been useful in bringing healthcare to undeserved areas, particularly in remote areas with minimal healthcare infrastructure and they serve as an investment in achieving better health outcomes through timely interventions and consultations. Additionally, with digital health solutions such as mobile health apps and online information hubs, rural populations can access essential disease-prevention knowledge, maternal care, vaccination schedules and mental-health advice; overall enhance the literacy/awareness within underprivileged communities where not enough healthcare assistance is accessible (Srinivasan 2021). In rural Maharashtra, for example, health campaigns on mobile platforms have increased sanitation- and hygiene-literacy rates and significantly decreased waterborne diseases (Srinivasan 2021). This capacity to get at the now available health resources on the Internet enables rural citizens to be proactive with regard to their own health, enhancing quality of life. Digital literacy also contributes significantly to enable rural people's access to social schemes and government facilities. Rural beneficiaries can also access crucial information about government welfare schemes like Pradhan Mantri Awas Yojana (PMAY), Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) or Ujjwala Yojana that are aimed at improving living conditions, financial support and social security through digital tools. While applicants from towns and urban areas can independently apply for these services, monitor the status of their applications and access necessary documents without relying on errant intermediaries who may charge unapproved fees, rural Indians need to exercise caution w.r.t. digital ability and readiness (Bharadwaj, 2020). Digital platforms also encourage increased involvement in governance and civic affairs, as they allow rural residents to obtain public services, submit complaints and engage with government officials through digital media. This promotes a civil society by which rural Americans have the means to voice their opinions and participate more fully in our democracy.

VI. GENDER, CASTE, AND SOCIO-ECONOMIC DISPARITIES IN DIGITAL LITERACY IN RURAL INDIA

Gender, caste and socio-economic inequities in digital literacy are key determinants that perpetuate the digital divide in rural India depriving marginalized communities from accessing opportunities in the emerging digital economy. Despite increasing efforts on the part of the Indian state (for instance through Digital India initiatives designed to address this gap) gender disparities in digital access continue to be a concern. Rural women, especially those from marginalized communities, are confronted with a set of formidable challenges in adopting digital technologies fomented on sociocultural and economic factors. As per the National Sample Survey (2019), only 14% of rural women report access to the internet against 32% for rural men, thus suggesting a stark gendered gap in digital facility (NSSO, 2019). Sociocultural and traditional gender roles are also among factors that hinder women from technology access in rural areas. Particularly in some societies, the role of a woman is to take care of family and children and other domestic work rather than going to school or acquiring any digital literacy (Desai & Dutta, 2017). This model of socialization and no backing from both the families and the society leads to women being sidelined in the digital economy, which further adds on to their socio-economic isolation (Vijayalakshmi 2020). In addition, digital literacy initiatives do not always cater the specific conditions of rural women, who need female-only spaces or gender-sensitive training to ensure larger participation. This puts women at a disadvantage for access to important services such as e-commerce, online education and telemedicine that are increasingly necessary for economic and social advancement in a digital world. Meanwhile caste-based inequalities have widened the digital divide, with disadvantaged sections of the population, such as Dalits and Adivasis, encountering difficulty in accessing digital knowledge. Caste-based discrimination remains widespread in rural India and this social structure is not commensurate with the fair spread of digital opportunities (Gurumurthy & Chami, 2020). For example, Dalit populations are not afforded equal opportunities at social inclusion in digital literacy programmes at a time when they bear caste-based discrimination which degenerate their access to education, training and resources (Sharma, 2018). Additionally, people's socioeconomic conditions play a crucial role concerning availability of digital devices and services. In addition to increasing penetration of

smartphones and services in cities, these rural households are struggling with economic challenges which restrict technology purchase as a luxury. As per the Internet and Mobile Association of India report 2020, internet access was available in merely 27% of rural households as against 63% of urban households highlighting huge disparity in availability digital infrastructure facility. The lack of economic resources in the countryside often hinders rural residents from lower-income backgrounds to purchase internet-enabled devices and reliable access services, thus further reducing their job skill opportunities³, finding work⁴, and getting online⁵ (NSSO, 2019). The socio-economic challenges to digital literacy in rural India are compounded by infrastructure deficits such as unreliable electricity and standard internet connections that could also obstruct the potential users of digital learning platforms from actually being able to access them. The multiplying impact of gender, caste and income-based disparities on access to digital resources has the cascading effect that digital inequalities are pervasive. For instance, a rural Dalit woman belonging to low-income family is more susceptible to face multi-layered exclusion not simply with reference of gender but also caste and economy. This multiple disadvantage sure means reduced like hood of acquiring digital literacy skills, and hence exclusion from life vital inputs -education health care employment (Jain 2021) from services opportunities. Intersectionality is therefore an important framework for understanding how digital literacy programs must be reshaped to respond to these intersecting forms of inequality. Programmes need to be sensitive to the needs of marginalized women and communities and work with these in a gender-just way that takes caste identities, socio-economic context into account. This might involve targeted interventions such as the provision of cheap digital devices, gender-sensitive training areas and raising awareness to the significance of digital literacy for women and minorities (Gurumurthy & Chami, 2020). Policy environments that redress such disparities should place emphasis on providing cheaper access to digital programming, improving rural digital infrastructure and fostering an inclusive educational and policy environment by actively engaging women, Dalits and other marginalized communities in digital literacy practices. Only through acknowledging and addressing these

overlapping disparities, can the digital divide in rural India be closed, leading to inclusive development.

VII. CASE STUDIES AND SUCCESS STORIES IN INDIAN CONTEXT

In rural India, the front runners of several digital literacy programs and pilot projects have revealed that technology can significantly assist in narrowing the digital gap and empowering marginalized communities, thereby indicating that technology can serve a key role in bridging social gaps and enabling inclusive development. An example of one success story in this direction is the Common Services Centers (CSCs) program initially initiated under Digital India vision, which acts as a vehicle through which digital literacy training, e-governance services and online education can be offered to rural people (GoI, 2020). The centers have brought essential services to the doorstep of far-flung rural residents including women and elderly such as online banking, government welfare schemes and digital healthcare consultations. Over three hundred thousand CSCs have been established all over India and these CSCs or digital cyber kiosks are rolling out a mechanism providing people in the rural areas access to digital devices thus facilitating an economic and social uplift for them (NSSO, 2020). For example, CSCs have reach and relevance of the communities through customized training on their modules to needy subsets such as the BOP for eg: access to digital economy (Patel 2021) at affordable rates with low-cost mobile phones preparedness and internet connectivity. The story of Digital Literacy for Women in Rajasthan is worth mentioning, the program was structured for rural women and provided training on digital geography, finance, online services enhancing self-reliance of women by enabling them to participate in making household decision as well as community actions (Bhardwaj & Soni, 2022). On similar lines, the (PMGDISHA) Pradhan Mantri Gramin Digital Saksharta Abhiyan Programme has been rolled out in 2017, which is striving to train 6 crore persons in digital literacy by 2025 and targets grassroots communities like disadvantaged classes including women, senior citizens and BPL card holders. The Centre aims to make rural citizens digitally literate by imparting digital literacy to the non-IT literate citizens of the country so as to enable them to actively and

effectively participate in the process of governance and also enhance their livelihood (PMGDISHA, 2020). By PMGDISHA scheme majority women and elderly are trained who would otherwise have been left behind from digital transformation taking place in India. Besides such efforts, a pilot project ‘Tech for Tribals’ in Odisha has made gigantic inroads to close the digital divide among tribal communities; the initiative has empowered members of local tribes by providing them with smartphones and training on using them, accessing online health services and acquiring digital literacy for better employment opportunities – thus diminishing their marginalization and enabling them to participate in digital governance, agriculture and e-commerce (Mehta, 2021). The programs have been the change agents in ensuring that those on the margins (women, elderly & tribal communities) are no longer caste-aways; thus, underscoring the catalytic effects of digital literacy when designed with inclusivity and felt needs. Also, these initiatives have increased access to essential services which includes telemedicine, e-learning and financial inclusion which mobile banking and digital payments are integral part, for economic development of the rural places (Singh & Verma, 2020). Learnings from successful programs have underlined that digital literacy initiatives for rural India need to be localized to suit the cultural, social and economic contexts of this region. For example, matching content and delivery mechanism in local languages and offering gender-sensitive and caste-inclusive training has been successful to make sure that women and marginalized communities feel at ease with, and motivated by digital tools (Mishra & Sood, 2021). Another takeaway is the need for collaboration between government, NGOs and other private sector entities to guarantee the sustainability and scaling of digital literacy projects. Experiences with programmes such as PMGDISHA have shown the value and positive influence of involving local intermediaries, such as village-level entrepreneurs and rural influencers, in spurring digital uptake by those within rural areas. Electronic Literacy also was effective in rural areas.” Furthermore, combining technology literacy development with existing community services (i.e. agriculture extension work, healthcare interventions and vocational training) is useful to improve the socio-economic status of rural people (Sharma 2020). These efforts likewise stress the fact that one cannot

refrigerate food in a house that has no electricity, and internet access (especially cheap at low data speed) to promote digital literacy is as foundational for success as other forms of infrastructures. These experiments’ success prove that ongoing evolution is necessary, and needs to be done with a focus on inclusivity, affordability, and sustainability of the initiatives so that rural India isn’t continually left behind in the digital age. In the end, the secret to bridging the divide and ensuring that all benefit from the digital economy is understanding and addressing all dimensions of marginalization when planning for digital literacy -- making sure access is available, affordable, AND appropriate.

VIII. POLICY RECOMMENDATIONS AND ACTION PLAN

A nuanced policy response is needed to effectively bridge the digital divide in rural India and promote inclusive development, one that encompasses the provision of digital infrastructure; making available affordable digital literacy programs; integrating gender and caste considerations into program design; incentivizing partnerships between the public and private sector (both formal firms as well as informal providers); and a clear implementation roadmap that is sensitive to locals’ needs. ICT infrastructure expansion is essential to achieve equal access to digital resources, and the government needs to emphasize both digitalization of rural broadband networks as well as cheaper hardware by emulating projects like BharatNet which would deliver high speed internet services to more than 2.5 lakh gram panchayats across India (GoI, 2020). The government also has to encourage private sector to manufacture 0 low cost, high-quality smartphones and internet-enabled devices for rural areas and reduce the price of mobile data further that is still a challenge in Mobile Data – the gateway to digital world, at present it becomes a bottleneck for poor families (Mehta & Sood, 2021). Having an affordable and accessible internet and devices would enable rural communities to access digital services like e-learning, e-governance or telemedicine – the necessary inputs to address various social problems. Parallel low-cost digital literacy programs should also be provided to address the multifarious needs of rural communities, and particularly that of women, older people and those

who have been historically excluded from formal digital training schemes. Government and non-governmental programs such as the Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA) that offers free training to rural people have been effective in elevating digital literacy rates, and such endeavors need to be expanded throughout rural India (PMGDISHA, 2020). These programs need to be organized in a way that allows for the training of as many people as possible, they should be low-cost and reflect conditions on the ground (including local languages and cultural aspects) to increase participation. In addition, the government should encourage nongovernmental organization (NGOs) and local community-based organizations to work with digital literacy programs for providing ground level training especially in backward areas where government programmes may not have much penetration (Bhardwaj & Soni, 2022). Moreover, digital literacy programmes need to be explicitly focused on gender and caste sensitivities to ensure the inclusion of women, the elderly, and marginalized communities. In the context of rural women's learning, specifically designed training initiatives should provide safe and female-only spaces for learning that respond to their practical life needs such as mobile banking, e-commerce on direct selling (including through social media accounts), or online provision of healthcare services, thus affecting livelihoods directly (Vijayalakshmi 2020). The elderly should receive training tailored to the hurdles they face: tech for health care plan, pensions, and government welfare schemes; as well as other forms of flexible communication not demanding on learning pace. Also, digital literacy programmes -focused on the Dalit and Adivasi communities- aimed at eradicating caste-based discrimination and ensuring equitable access to engage in the digital economy (Gurumurthy & Chami, 2020). A very good example is the "Tech for Tribals" project, which combines digital literacy and livelihood-cum-empowerment programmes among tribal communities, which should be replicated in more rural areas (Mehta, 2021). PPPs are crucial to the long-term sustainability and scalability of digital inclusion programs. By promoting partnership between government, private sector and civil society with their resources and expert, new ideas and practices may contribute to closing the digital gap. For instance, telecom firms could offer

discounted mobile data packages and low-cost devices, and technology companies might develop training programs or application-based tools uniquely tailored to the needs of isolated rural populations (Sharma, 2020). In addition, the PPPs could help to redevelop or supplementary digital literacy programs that are constantly updated and compatible with the new developments in the fields of technology in order not to always lag behind and leave rural areas from benefiting of thriving technologies. To realize these recommendations, a feasible policy reform framework is necessary, which embeds digital literacy within broader rural development initiatives. The framework also will have specific goals for digital inclusion, measurable outcomes and timelines to meet benchmarks in digital literacy. Local and state governments working with community leaders would seem best positioned to be instrumental in the tailoring of these programs for rural populations. In addition, mechanisms to monitor and evaluate digital literacy initiatives will be needed to measure the impact. This work on access, but also identify problems of exclusion and reorient strategies on the basis of this assessment. It is therefore proposed that the inclusion of digital literacy into the rural development agenda in India will not only bridge digital divides, but foster social and economic growth in rural spaces giving marginalized populations opportunities for education, employment, health care and governance (Jain, 2021). In short, an integrated, multi-stakeholder approach is required to achieve a digitally inclusive India with hinterland populations becoming active participants in the digital economy and reducing social disparities leading to sustainability.

CONCLUSION

In sum, this study shows that digital literacy can be a key to waning the social disparities in rural India with regard to economic opportunities, health care education and social services. Digital literacy initiatives like Common Service Centres (CSCs), the Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA) and customized projects for the ones at peripheries have shown how digital access can empower rural people, especially women, aged or vulnerable groups in low-income categories to access essential services and opportunities (GoI 2020; PMGDISHA 2020). Nonetheless, the persistent digital

divide caused by infrastructure deprivation, socio-economic exclusion, and gender-related discrimination underscores the necessity for more robust policy measure and targeted intervention to ensure that inclusiveness grows. Policy is crucial to reach the most marginal sections of rural society (Gurumurthy & Chami, 2020) with digital literacy initiatives, including creating infrastructure for broadband expansion as well as subsidized digital equipment and gender-sensitive training (Gurumurthy & Chami, 2020; Mehta, 2021). Also, public-private partnership (PPP) becomes essential in developing scalable solutions that ensure sustainability and extend the reach of such programs – especially to be able to cover remote and underserved areas where digital infrastructure is still woefully lacking (Sharma 2020). The long-term future of ‘digital in rural India is not bleak but promising, with possibility of devising scalable solutions that do not only deliver digital literacy training but stands to stimulate sustainable social and economic empowerment while fostering inclusivity and equity (Bhardwaj & Soni, 2022). There is potential synergy between programs for DL promoting agricultural, health and vocational education and other rural interventions to induce rapid changes in the life of people living in rural areas keen on accessing information. The need for increased digital literacy to tackle these enduring inequalities cannot be overemphasized, for without it, millions of rural Indians stand at risk of being more marginalized in an increasingly digitally enabled world (Jain 2021). To this end, all parties - government, civil society and private sector - should work to promote digital inclusion and adopt enabling policies that can be used to invest in the infrastructure and initiatives needed to develop the digital capabilities of rural populations so that they are enabled to fully engage with 21st century economy, hence reduce social inequalities and advance sustainable development.

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