International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 10 Issue: 12
***Article Received:** 25 July 2022 **Revised:** 12 September 2022 **Accepted:** 30 November 2022*

Digital Literacy and Infrastructure: A Comparative Study of India and USA

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Abstract

This paper presents the study on comparing the digital infrastructure and literacy echelons of India and USA, with focus on intersection of digital experience and infrastructure. Digital experience is the knowledge and skills that one possesses to operate digital technologies and tools. It is used for communication, sharing information and working in this digital world. For making nation's population digitally literate, digital infrastructures plays an important role. This study opted for India and USA as these both nations are at different stages of development, which makes them for good base to make this comparative analysis. This study is based on secondary source of data, where data has been taken from DataReportal 2022 reports of India and USA. It is discovered that although India lags in terms of digital inclusivity and literacy than USA, but digital adoption rate of India is incredible. Various initiatives by Indian government are improving digital literacy levels. USA has well established infrastructure which sets a bar for performance in digitalization. India has yet a lot to achieve, Indian Government can shape its efforts as per the programs and steps initiated by USA digital model to make nation digitally literate and develop its infrastructure.

Keywords: Digitalization, Digital inclusions, India, USA, Digital Infrastructure

1 Introduction

Digital literacy has a significant role in filling out the gaps in context of socio-economic means and helps in social inclusion and digital experience. It holds the ability to adopt, use and understand technologies in better way. Digital literacy programs are said to raise knowledge base, accelerate development process for underserved section and improve health literacy as well (Radovanović et al., 2020). It helps in developing skills that are leveraged for enhancing communication, critical thinking, technological capabilities and problem solving (Vodă et al., 2022). In developing countries, digitalization is a tool of economic growth and empowerment through digital inclusion, as does not only improve skills of workers, but also lowers transportation costs (Nguyen, 2021). Since, the world is shifting towards digitalization as a very fast pace, it is becoming necessary to opt for digital skills for effective learning experiences and development of economy (Abiddin et al., 2022; Vodă et al., 2022). Digital revolution and empowerment in global context is possible only with digital literacy. Digitally literate population and nations can lead to organizational digital transformation and sustainable development. Employees effectively contribute to organizational success while leveraging digital. COVID-19 pandemic has made digital literacy even more significant in order to reduce disparities and shifting everyday life to digitalization.

The state of digital literacy in India through various initiatives that aim for improving socio-economic growth and the provision of public services, gives evidence of India's rapid

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digitalization. The creation of digital public infrastructure (DPI) blocks as a result of the digital India initiative has had a major influence on the financial and health sector. Indian government has opted for various policies to address challenges in infrastructural facilities in terms of physical and socio-economic context, which again contributes to digital economy (Paul et al., 2020). Besides various efforts to improve digital literacy, India still is considered in struggling phase. Underprivileged sections of rural as well as urban areas have limited access to digital education. Talking about women, they also face severe cultural and structural barriers to access digitalization. On contrary, United States of America (USA) is known for universal internet penetration and advanced digital services (Acs et al., 2021). In America, government policies combine provision of devices, networks, and skills as efforts for digital inclusion. This effectively reduces gap to access to digitalization (Robinson et al., 2020). America also faces digital inequity where various factors contributing are education, age, urban- rural divide, income, ethnicity etc. (Charness and Boot, 2022). For elderly people exiting jail, the gap is particularly noticeable because they have a harder time reintegrating into a society that is becoming more and more digital in America. So, we can say that digital literacy is still at evolving stage whether we talk of developing nation or developed nation.

Digital literacy and internet usage are highly correlated. Diverse internet usage signifies higher levels of digital literacy (Nipo et al., 2020). Internet use for assessing information and career-related purposes is improved by digital literacy (Deursen & Dijk, 2016). Internet speed is also associated with digital education, which in turn contributes to overall digital literacy. Social media usage is another factor that gives a glimpse of whether population is digitally able or not. There can be direct link in social media usage and digital literacy, as only those individuals can operate social media effectively who have digital skills. There is an important relationship between social media usage and digital literacy. Next, digital literacy skills are also affected by mobile connections. As per the research, individuals that have abilities to use mobiles and computers, gain digital skills over time (Correa et al., 2022). Mobile technologies offer unique opportunities for development of digital literacy, so that information can be assessed from anywhere and ideas can be shared (Churchill, 2020). Therefore, the present study tries to find out the present status of digital literacy of India and USA through Secondary Reports.

The reports of DataReportal 2022 for USA and India has been used to collect the current scenario about the data infrastructure and digital awareness among the populations. India and America are both at variant stages in terms of digital adoption and development, which makes a good base for making comparisons of both these nations. Although Internet of Things (IoT) technologies are being adopted in both nations, the variables driving adoption differ greatly because of social influence, cultural considerations, and enabling conditions.

2 Review of Literature

Concept of digital literacy is complex, which encompasses various other skills besides technological proficiency (Walton, 2016). The idea combines social awareness, communication, and critical thinking in digital settings ((Walton, 2016; Martínez-Bravo et al., 2022). There are multiple dimensions of digital literacy including functional, sociocultural, critical, transformative, and socio-economic aspects. Research competence and students' digital literacy have been found to be significantly correlated in studies, while digital literacy alone does not always improve critical thinking abilities (Indah et al., 2022).

Digital initiative programs in India such as Digital India have increased the reach, but barriers like cost, low literacy and gender inequality still exists (Radovanović et al., 2020). Digital division of India is dependent on socio-economic factors such as urban-rural divide. Instruments like Kisan Credit Cards having a positive impact on India's literacy rates. Financial technology has demonstrated the ability to increase digital literacy. However, poverty levels reduce the association between digital literacy and financial technology, underscoring the necessity for focused interventions (Gautam et al., 2022). Mobile phones are emerging as key tools in rural areas to empower women, along with Rural Mobile Infrastructure Operator model contributes to Goals for Sustainable Development in Underserved Areas (Hossain & Samad, 2020; Prieto-Egido et al., 2022). But the digital divide is still a complicated problem that is impacted by socioeconomic factors and disparities in ability, especially in rural and underdeveloped urban regions.

According to research, there are still significant digital gaps in North America, which disproportionately impact older people, people living in rural areas, and people from poorer socioeconomic backgrounds (Adopt, 2022; Gallardo et al., 2020). Although, Internet access is widespread in USA, cost and digital skills still remains a great obstacle, especially in older age group. In America, there is clear differences in digital inclusion between urban and rural areas, with urban areas receiving greater benefits from digital measures (Robinson et al., 2020; Gallardo et al., 2020). Age, ethnic

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background, education, income, and whether one lives in an urban or rural area all affect internet access disparities in the United States (Adopt, 2022). There is need of comprehensive strategy integrating network, device, and skill provision through educational sector to address these inequities and digital literacy (Robinson et al., 2020).

Various studies have been undertaken to compare digital literacy trends of developed and developing nations, but as per researcher knowledge no specific recent data study has undertaken for making comparison of India and America in this respect. After going through the literature, the research problem arises that what is the real reason of India lacking behind in the digital literacy. The main argument of the present study is that, what is the actual state of digital literacy in India (developing nation) as compared to USA (developed nation) in respect of data usage, speed connection, social media statistics and mobile connections and how these factors are important in achieving digital literacy for digital inclusion and empowerment? Therefore, following research questions are formed for giving answer to this argument:

3 Research questions

a) How the trends of internet usage in India are different from America for digital literacy?
b) What are factors affecting internet speeds of India and America for digital literacy?
c) Is there any difference in social media statistics of India and USA showing digital literacy?
d) How pattern of mobile connections in India is different from USA for digital inclusion?

4 Methodology

This study in based on secondary source of data. Data source for this respective study is DataReport 2022 Reports of India and USA. These reports provide deep insights and up- to-date statistics. This study adopts for comparative analysis for comparing digital literacy trends of India and USA. The study finds similarities, differences, and implications for digital inclusion in both countries by utilizing secondary data. For graphical presentation of figures of this study, that is Pie charts and Bar graphs, MS Excel has been used. Although the results offer insightful information, they might not account for subtle behavioral variations or quickly changing trends after the report is published.

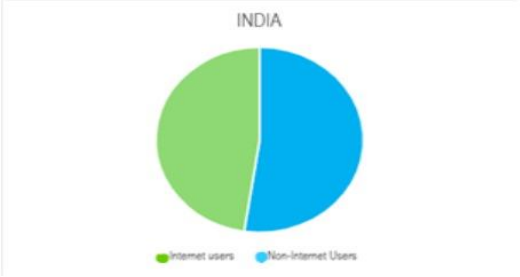
5 Analysis and Discussions

5.1 Trends of internet usage in India and USA for Digital Literacy

There were 658 million internet users in India. At the beginning of 2022, 47 percent of Indians were digital users. Between 2021 and 2022, India's internet user base grew by 34 million, or 5.4%. On the other side of coin, figures show that 53 percent of population still is not using internet (Digital 2022).

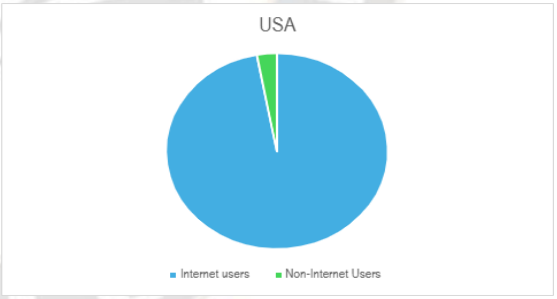
In comparison of India, USA, in 2022, there were 307.2 million internet users in the US. According to data 92 percent of Americans were online. Between 2021 and 2022, the number of internet users in the United States increased by 8.4 million, or 2.8 percent. For comparison, these user numbers show that Americans were not online at the beginning of 2022, indicating that 8 percent of the population was not using internet at the start of the year (Digital 2022).

Figure1: Internet users and Non-users in India (in percentage)



Source: Author's creation

Figure2: Internet users and Non-users in USA (in percentage)



Source: Author's creation

The data shows (Figure 1 and 2) that; the percentage of digital users are much more in USA as compared to India. America has better digital literacy and access to technology which contributes better digital penetration (Guess et al., 2020). USA's older population holds great trust in exhibiting more information-seeking habits and make use of online resources, as compared to their Indian counterparts.

While, in India, the current socioeconomic climate worsens the country's digital divide, which impacts both rural and urban areas. Also, nation is facing these challenges due to limited access to digital education and employment opportunities.

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Internet users' population in USA has greater edge over internet usage because USAID (United States Agency of International Development) is working to expand digital access through investments in digital connectivity. It is following an approach which not just accesses to physical devices and infrastructure but also ensure that users possess a nuanced set of skills to meaningfully, responsibly, and safely participate in their digital ecosystem (USAID).

The rate of adoption of Internet is high in India as compared to USA, but still India is lagging behind in internet usage as per given data. To extract all the benefits of digitalization, India has to maintain this positive rate or rather expand it. This trend also shows that Indians are getting aware about internet and adopting the same at higher rate. Digital media literacy programs have demonstrated potential in both nations for digital empowerment. Indian government has taken various initiatives in this matter to achieve widespread digital literacy and improving internet usage. Few mentioned are Digital India Program, Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA), National Digital Literacy Mission (NDLM), Digital Saksharta Abhiyan (DISHA), National Digital Library of India (NDLI) etc. (The United Indian). These schemes offer knowledge base to improve internet using skills along with upgrading digital literacy rate and leading to empowerment. These schemes justify positive internet adoption rate in India.

5.2 Factors affecting internet speeds of India and USA for digital literacy

Table1: Data on internet speeds of India and USA

Internet speed	India	USA
Median internet speed across cellular networks	14.39 Mbps	53.31 Mbps
Median fixed internet connection speed	47.40 Mbps	134.10 Mbps
Rise in median mobile internet connection speed	55.7%	24%

Source: Digital 2022, DataReport

Particulars specified states that both median mobile internet connection speed across cellular networks and median fixed internet connection speed are higher in USA in contrast to India. USA has moderate internet connection speed because of various factors. Deployment of 4G networks across nations is the major contributing factor for increased speed.

Along with this, there has been a good investment in developing and expanding fiber-optic networks, providing for reliable internet connection. Moreover, there has been continuous enhancements in ISP (Internet Service Providers) in the U.S., such as Spectrum with a high median download speed, are continuously working to enhance their services and provide better speeds to consumers. On contrary, according to some Telecom Industry experts, the slow bandwidth speed in India is due to the high cost of spectrum leading to Internet Service Providers (ISPs) resisting investment much into the spectrum (Mondal, 2020). While the internet connection speed rose by much greater rate as compared to that in USA (as per Table 1). This is due to the efforts of Government and Ministry of Telecommunications in India. Plans have been made making broadband highways through which approach is to link 2,50,000 Gram Panchayats through internet. Moreover, Under the Bharatnet project, 4,24,299 km of Optical Fibre Cable has been laid, connecting a total of 1,50,029 Gram Panchayats (Mondal, 2020). In addition, 1787 Gram Panchayats have been provided connectivity through satellite media. Few other programs under Digital India include Universal Access to Mobile Connectivity, Public Internet Access, e-governance and e- Kranti which focuses on electronic delivery of services, which will be the good initiative for digital empowerment. Therefore, few factors which contribute to the internet speed are investment, proper government initiative, high cost spectrum, need of deployment of 4G networks in India.

5.3 Social media statistics of India and USA showing digital literacy

Table2: Percentage of Social media users in India and USA

Social media	Indian users	American users
Facebook	84.1%	70%
YouTube	50.1%	81%
Instagram	59.2%	40%
LinkedIn	48%	28%
TikTok	-	21%
Snapchat	19.76%	25%
Twitter	63%	23%
Pinterest	5.4%	31%

Source: DataReportal,2022

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Total active social media users in India are 32.2%, while in USA are 70.12%. Rate of social media users is more than 2 times in USA than India. It is very clear from Table 2 that number of social media users are more in USA as compared to India. Factors that contribute to more usage of social media are urge of meeting new people, information needed to be shared or searched, and need of sharing media. Also, people who like to maintain relations and stay connected with world use social media. Moreover, it is source of entertainment for most of the people (Tiwari & Tiwari 2020). So, it can be said that American population is inclined more towards making friends and staying connected. While Indians are little laid back in this perspective as per data due to less digital literacy rate.

Moving on data also shows that in India social media users increased from period of 2021-2022. For same period, social media users in United States of America remained same. This increase is due to pandemic. Some people also have very unrealistic expectations from social media platforms regarding financial incentives, when not met they drop using social media as they just don't want to remain restricted to networking (Krotov & Sahoo, 2014). Many people have also cut back on their social media use because they value their privacy. Additionally, it increases negative feelings and message overload. So, there can be any of the above-mentioned reasons that social media using population is at declining stage in both countries.

5.4 Comparison of mobile connections in India and America for digital inclusion

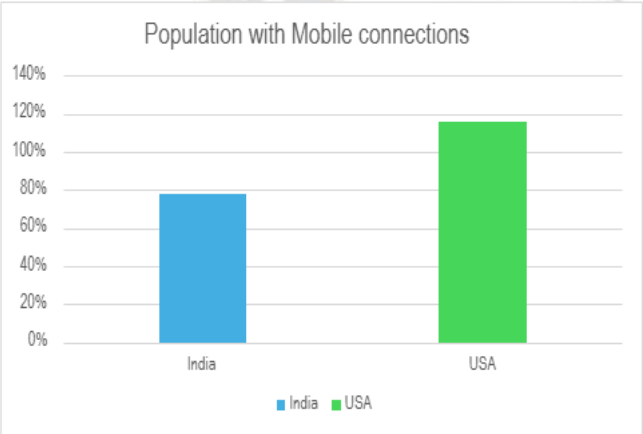

Figure3: Population with Mobile connections in India and USA (in percentage)

Source: Author's creation

From above data it can be seen that 78% of Indian population is having mobile connections and for USA rate is 116.2%. The major reason why Indian population still lack in having mobile connections are gender disparity and digital exclusion. Women are usually considered to do household chores and fact is shaped that they don't need mobile connections. They are not even provided inexpensive phones. (Potnis,2016). Apart from women being discouraged to use mobile phones, financial constraints and digital illiteracy also contributes to lower mobile connections (Tusińska, 2021). Another major obstacle in India is poor public investment and inefficient infrastructure (Miller, 2001). Just the reverse in USA, it has excellent percentage of population using Mobile connections. Factors like employment in specific jobs contributes in this matter. Along with this, age structure and affordability are greatest contributors for good mobile connections and the other important factor is low digital literacy rate but still government is trying to increase the digital inclusivity.

Indian performance in terms of digital inclusivity is improving at exceptional rate. This can be due to various government initiatives that are focused to create digital awareness. Various schemes such as Digital India Program, Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA), National Digital Literacy Mission (NDLM), Digital Saksharta Abhiyan (DISHA), National Digital Library of India (NDLI) etc. aims at improving internet usage (refer Table 3). Additionally, various programs under Digital India focuses on providing electronic delivery of services, which in turn builds trust in user of that particular service. Further here is the glimpse of certain initiatives taken by Indian Government in order to promote digital inclusivity in rural India.

Table3: **Various initiatives taken by Indian Government in Rural India to improve Digital literacy**

Initiatives	**Scope**
Digital India Program	Aims to provide high speed internet connectivity and Common Service Centers (CSC) to provide access to various digital services.
Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)	It trains rural population to use digital gadgets and applications, including payment, social media and e-mail.

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Village Level Entrepreneurship (VLE) Program	It creates employment opportunities for rural India by developing digital skills of individuals.
Mobile Vaani	It provides interactive voice response (IVR) platform to gain information on various topics such as agriculture, healthcare and education.
Digital Empowerment Foundation (DEF)	A non-profit organization that trains individuals to utilize digital applications and create awareness about benefits of digital literacy.
Corporate Social Responsibility (CSR) Initiatives	Under this initiative various companies consider it their responsibility to create awareness about digital literacy in rural India.

Besides these initiatives and improvement in performance, still there are many loopholes which yet needs to be filled. Illiteracy level and privacy concerns adds to this issue. Poor infrastructure, lack of mobile connectivity and lack of investment in digital sector is also a hurdle in digital literacy. India's regional divide, that is, inequality in urban and rural areas also poses problems for digital inclusivity. In addition to this, gender inequality especially in rural areas is again major factor that contributes to lack of digital skills.

6 Practical Implementation

Digital literacy plays vital role in any nation's progress so India needs to take up some improvising measures. Beside all the initiatives already taken, more is needed to improve digital literacy. Highest contributing factor in low rate of digital literacy is illiteracy. This issue can be solved through incorporating local languages and icons in digital applications. Also, audio should be made part of digital devices to ensure ease of use. Trainings must also be provided to raise digital awareness. Investments must be made in basic infrastructure like Electricity and Internet connectivity. Initiatives like BharatNet should be taken seriously and executed nationwide. Further, cost of digital devices and services should be reduced by make in India initiative by giving employment to the population. All these efforts will bear fruit only when people would be aware of benefits of being digitally literate. Proper trainings should be provided and awareness campaigns should be organized people, especially rural population get to know about its benefits and build trust in using digital tools

In USA, Government executes various initiatives to constantly improve digital literacy. Besides government sector, private sector also initiates to promote digital literacy, such as engaging Major internet Service Providers (ISPs) to expand broadband coverage. There are various programs under which low-income groups are provided internet services at discounted rates. Therefore, India can adopt the digital model pattern for internet usage, speed, social media statistics and mobile connections of USA. Indian government can use this research as basis for making initiatives based on USA model of digital adoption and inclusion for empowering the population by collaboration of non-profit organizations and private sector will speed up the process. Private sectors must start considering it their responsibility to create awareness among people especially in rural areas regarding digital literacy. Also, gender and age divide should be minimized to extract maximum benefits. Efforts need to be done at each and every level to attain 100% digital literacy.

India should tailor its strategies keeping in mind USA ones and opt for digital policy that starts from very basic school level, whereby students are taught importance and benefits of being digitally able in government and private schools. Community centers should be built to impart digital trainings. Along with this cybersecurity education should also be imparted to make effective use of digital tools and applications. Appropriate investment should be made in infrastructure by government to ensure proper utilization of Digitalization. Also, senior and rural population should be encouraged to use digital tools and applications on daily bases and regular tasks. Since government alone cannot do everything, other sectors should also put their efforts in accelerating process. Keeping in view higher illiteracy level in India, audio and icons should be incorporated in digital applications for ease of use. Lastly, rural women should also be encouraged to improve digital inclusivity in India.

7 Conclusion

In modern era, Digital literacy is very important component. It plays significant role especially in fields of education and employment. Digital literacy helps in digital inclusion by making access to information and usage of technology easy. It also empowers by equipping people with skills, knowledge and ability to operate and utilize digital tools and applications. This review of digital inclusion of India and USA shows contrasting perspective of India and USA in terms of digital literacy through internet usage, speed, social media statistics and mobile connections. Overall, both nations face unique challenges to attain digital literacy in terms of socio-economic, cultural, age, and infrastructural factors. But, in comparison of India, USA exhibits better picture in terms of digital literacy. On the other hand, USA also faces some

inclusivity challenges due to various reasons such as Urban-rural disparities, economic divides, and varying levels of digital literacy. Although challenges persist but still USA holds edge in terms of digital inclusion when compared with various nations. Various private sector companies support educational programs for the same. Coming to non-profit organizations, these also offer various digital literacy programs to bridge out the gap in digital skills.

In both countries schools and educational institutions should incorporate technology to improve base of students. Along with this, 4G technology implementation has the capacity to completely transform connectivity by offering dependable and faster internet services. Furthermore, these efforts should be in alignment with sustainable and ethical practices. Therefore, this study highlights that the position of internet usage, factors of internet speed, social media statistics, mobile connections plays an important role in digital literacy. These factors also explain the situation of digital inclusivity and empowerment. The study also highlights the major areas on which Indian government can work upon to adopt the USA model. In conclusion, through collaborative and innovative strategies to raise awareness, both regions can overcome the challenges and grab the opportunities presented in this digital era. India should prioritize digital literacy and should incorporate USA's model and strategies to harness the benefits of digital literacy to accelerate social inclusion, innovation and economic growth. The goal of digital literacy and inclusion is not merely a matter of connecting people, it is a commitment to fostering empowerment, equality, and shared prosperity in an increasingly interconnected world.

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