Exploring the Gender Digital Divide: A Study to Measure Digital Literacy and Digital Access of Females

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Abstract

Purpose of the study: ICT plays a vital role in enhancing the knowledge and skills of the workforce in various sectors of the economy. In a report by UNICEF in 2017, there is a 42% digital gender gap in India which is very high compared to the global average. The proposed research paper aspires to measure the extent of digital literacy and digital access, assess the barriers to female digital literacy and examine the government policies toward digital literacy to empower women.

Data and Methodology: The current research is based on a mix of primary and secondary data collected. The primary data is collected from females from the household, organised and unorganised sectors with ages of more than 18 years in the district of Ghaziabad. A sample of 209 females has been collected. The two-way ANOVA is used in the study.

Findings: The study finds out that there is a lack of digital literacy and digital access across the region. The study shows the significant differences in digital literacy among different sectors and income groups while there is a significant difference in digital access among income but no difference among sectors.

Keywords: Digitalisation, Digital India, Digital Divide, ICT, Policy Implication, Women Empowerment

Introduction

Gender Digital Divide

Digital transformation and the use of Information and Communication Technologies (ICT) are promising arenas across the world for enhancing the growth and welfare of global citizens. ICT plays a vital role in enhancing the knowledge and skills of the workforce in various sectors of the economy. It provides the opportunity to be included in economic activities and uplift the standards of living. The term "Digital Divide" can be defined as the inequalities in access to ICT due to a lack of skills or lack of infrastructure. Now gender digital divide can be explained as the disparities in access and skills to use ICT due to the difference in genders. According to a report by UNICEF in 2017, there is a 42% digital

gender gap in India which is very high compared to the global average. This report also stated some instances in the states of Haryana and Uttar Pradesh where bans have been imposed on unmarried girls to use the internet and mobile phones. The fifth National Family Health Survey (NFHS) reveals that, in every 10 women, 3 in rural areas and 4 in urban areas have used the internet in India. A report by OECD in 2018 finds out that the women who perform more ICT intensive tasks are getting 12% higher pay than their male counterparts. In light of the above discussion, the study focuses on the existence of the gender digital divide in the Ghaziabad region and the roles of policies in removing this.

Review of Literature

Martin, A., & Grudziecki, J. (2006), Digital Literacy refers to the understanding, perspective and capacity of a person to utilize digital tools and synthesize digital resources, build new knowledge, build media expressions, and share with others, related to particular life situations, to take positive social action; and to focus upon this process. Hence, the ability to contemplate and analyse your surroundings, which is the fundamental purpose of literacy, becomes pivotal towards the understanding of Digital Literacy.

According to the census 2011, "A literate person is one whose age is more than 7 years and that person can read and write". Despite such a narrow definition of literacy, according to the research and findings of Nazneen, A. S., & Nakhat, N. (2014); The mean literacy rate of females in Uttar Pradesh is 59.26%, The highest literacy of females was traced in Ghaziabad district (81.42%), The lowest literacy of females was observed in the Shrawasti district (37.07%), 15.49% of districts in the state possess a very high female literacy, Almost 29.57% of districts are blessed with high female literacy, Average female literacy is observed in the 21.12% districts in the state. This underlines the gravity of the dire need for female literacy in the state of Uttar Pradesh.

Quoting Antonio, A., & Tuffley, D. (2014); The empirical evidence suggests that education is a solution to the rife problem of the digital divide. A female who has at least completed her matriculation has a higher chance to engage in technologies and opportunities associated with it, while the uneducated female has a lower chance to engage in technologies and related opportunities, regardless of their access to them. The higher technological engagement of women means the better educated they become and it causes them to engage conveniently in economic and social activities.

However, Socioeconomic and technical analysis alone will not provide a satisfactory solution to the problem of the digital divide as the problems also have political, cultural, ethical, and industrial relations dimensions. Information Technology for Development. Therefore, probable solutions are required to change the attitude of the organisations. To do this, it is necessary to recognize all the dimensions of the global information society and telecommunications trends and to seek to deal with them. (Quoting Ahmed, A.,2007).

According to Sharma, R. C. (2003). The most notable of the barriers to the use of ICT in education in developing countries seems to be the political will of the people in the power corridors. The lack of allocation of sufficient funds for the educational sector and ICT adds to the woes The technological handicap amongst teachers is another concern. Although; according to Smitha, H. S. (2017); Cyber regulations have to be made very effective to protect women from cybercrime. Corporate tie-ups need to endeavour toward the promotion of women's entrepreneurship and gender budgeting. It can be deduced that digital literacy helps to reduce gender inequality in the workplace. Hence, policies must consider the following suggestions so that the number of benefactors from the policies could be increased.

Research Methodology

Research Problems

In the era of the 4th Industrial Revolution where information and communication technology is the main driving force in industrial development, it requires that labour should be skilled in digital means irrespective of their gender. A report "The State of the World's Children 2017" states that the gender digital divide is huge in India. About 29% of total internet users in India are female which

is significantly low. The consequences of skewed participation rates associated with the use of ICT are significant at both a personal and community level. If an able woman is confined to the reproductive roles she is unlikely to cash on her meritocracy. At the community level, the impact of the inability of such women to participate in economic activities will have a trickle-down effect on developing economies. Hence, the problem of the Digital divide becomes that of grief concern. This implies the need for policies to correct the situation of the gender digital divide. The proposed research aspires to measure the extent of digital literacy and digital access, assess the barriers to female digital literacy and examine the government policies toward digital literacy to empower women.

Objectives

- To identify and document the extent of digital literacy of women in Ghaziabad.
- To assess the difference in digital literacy following different income levels and sectors of occupation.
- To identify and document the extent of digital access for women in Ghaziabad.
- To assess the difference in digital access following different income levels and sectors of occupation.
- To assess barriers to using ICT by women across the region.
- To examine the governmental policies working towards digital literacy in empowering women in India.

Hypotheses

- **H01:** No significant presence of digital literacy in Ghaziabad.
- **H02:** No significant presence of digital access in Ghaziabad.
- **H03:** There is no significant difference in digital literacy among different income levels.
- **H04:** There is no significant difference in digital literacy among different sectors of occupation.
- **H05:** There is no interaction effect on digital literacy of different income levels and sectors of occupation.
- **H06:** There is no significant difference in digital access among different income levels.
- **H07:** There is no significant difference in digital access among different sectors of occupation.
- **H08:** There is no interaction effect on digital access of different income levels and sectors of occupation.

Methodology

The study is executed in the Ghaziabad region as there exists a huge gap between the male and female population in terms of ability to operate or use the internet. (NSS Report No.585: Household Social Consumption on Education in India, 2017). The current research is based on a mix of primary and secondary data collected. The primary data is collected from females from the household, organised and unorganised sectors with ages of more than 18 years in the district of Ghaziabad. The secondary data is collected from various publications of the central and local government; research journals; newspapers; the research has also considered reports prepared by research scholars, universities, etc.

The study tries to find out the overall digital literacy, and digital access in the region. Then, by using ANOVA, the relationship between income level and digital literacy, the relationship between income level and digital access, the relationship between the occupational sector and digital literacy and the relationship between the occupational sector and digital access. The study compares the differences in mean values of digital literacy and digital access based on differences in sectors and income levels. The interaction effect of both categorical variables is also considered. At last, the study documented the reach of government policies on females in the region.

The data is collected from the district of Ghaziabad, Uttar Pradesh, India. The sample includes females over 18 years from different occupational backgrounds. The sample includes females who are working as housewives, working in the organised and unorganised sectors. A questionnaire was prepared with a mix of open-ended questions and close-ended questions. The survey was bilingual, wherein the respondents were given a choice by the enumerators to either answer the survey in English or Hindi based on their

convenience to ensure the legitimacy of the response. There were 4 sections in the questionnaire which included:

Section 1: Basic information.

- Sex (Male/Female)
- Which Sector are you currently working in? (Organised/Unorganised/Household)
- Your Individual Monthly Income is? (Open Ended)
- Your Family's Monthly Income is? (Open Ended)
- How many hours of electricity access do you have at your home? (Open Ended)
- Do you own a mobile phone? (Yes/No)
- For how long have you been using a digital device? (Open Ended)
- Who taught you how to use the computer/mobile phone in the first place? (Friends or Family/Self Learned and Media/Teacher or trainer)

Section 2: To assess digital literacy.

- How would you rate your digital literacy (the ability to use digital technologies)? (5-point Likert scale)
- How would you rate your web search skills? (5-point Likert scale)
- How frequently do you use E-MAIL? (5-point Likert scale)
- Do you use the computer/mobile for learning purposes? (Yes/No)

Section 3: To assess digital access.

- How many hours of internet access do you have at your home? (0 to 8 hours/9 to 16 hours/17 to 24 hours)
- How many digital devices do you have in your home? (1-2/3-4/4-5/5+)
- How many hours of access do you have to at least one digital gadget at your home? (0 to 8 hours/9 to 16 hours/17 to 24 hours)
- Do you use a cell phone, or smartphone to access the internet? (Yes/No)
- How much would you like to pay for your internet services? (Open Ended)
- How do you use the internet? (To find information, To deliver information, To produce information, To collaborate with others/None)

Section 4: To assess the reach and role of government policies

- Do you know about Government policies working towards digital literacy in India? (Yes/No)
- Select the policies of which you have any knowledge. (Pradhan Mantri Kaushal Vikas Yojana, Digital Saksharta Abhiyan, National Digital Literacy Mission, Common Services Centers, Digital India Program, Accessible India Campaign and Mobile App)
- Select the objectives that you think have been satisfied by these policies. (Delivery of public services, ICT for rural Empowerment of socially disadvantaged people for inclusive growth, Access to quality education/skill up-gradation, Access to cost-efficient & quality health services, Impart digital awareness and knowledge to one member for every household of the poor, rural citizens, Training to operate computer or digital access devices (like tablets, smartphones etc.), send and receive e-mails, browse the Internet, access Government services, Provide Monetary Awards for Skill Certification to boost employability and productivity of youth by incentivizing them for skill training, Make the Digital infrastructure more accessible to you)

A sample of 209 females has been collected. It includes 81 housewives, 64 females from the organised sector and 64 females from the unorganised sector. 92% of the respondents have their mobile phones while only 80% of the cells have access to the internet. Around 69% of the females use digital devices for learning purposes, yet only 57% of the total sample is aware of the Government policies working towards digital literacy in India.

Findings and Analysis

The scaled average of values is used to analyse the data collected. Where in the researchers concluded that 74% of the female population has less than the average value of digital literacy in Ghaziabad, signifying the lack of digital know-how amongst the marginalized. Where as only 32.3

% of the females have digital access. There by reflecting the dearth of digital access amongst individuals. Hypothesis 1 focuses on the significant presence of digital literacy in the region of Ghaziabad. The average value of scale is 2 and through figure 1, it can be seen that the mean value of digital literacy is 1.733407 which is less than the mean value of scale. This implies that the null hypothesis is not rejected and there is no significant digital literacy in Ghaziabad. Hypothesis 2 focuses on the significant presence of digital access in the region of Ghaziabad. The mean value of scale is 2 and through figure 1, it can be seen that the mean value of digital access is 1.810841 which is less than the mean value of scale. This implies that the null hypothesis is not rejected and there is no significant digital literacy in Ghaziabad.

Figure 1: Mean of Digital Literacy and Digital Access

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. mean DigitalLiteracy DigitalAccess

Mean estimation                 Number of obs    =       226
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	Mean	Std. Err.	[95% Conf.	Interval]
DigitalLiteracy	1.733407	.0589569	1.617229	1.849585
DigitalAccess	1.810841	.062219	1.688234	1.933447

Source: Self Produced

Hypothesis 3 focuses on the difference in digital literacy among different income levels, hypothesis 4 focuses on the difference in digital literacy among different sectors of occupation and hypothesis 5 focuses on the interaction effect on digital literacy of different income levels and sectors of occupation. The 2 way ANOVA table in figure 2 shows that the sectors have a P-value of 0.0004 which means that the null hypothesis is rejected and there is a significant difference in mean values of digital literacy across different sectors. Figure 2 shows that the income has a P-value of 0.0115 which means that the null hypothesis is rejected and there is a significant difference in mean values of digital literacy across different income levels. The P-value of 0.0841 of the interaction effect of income level and sector of occupation means that the null hypothesis is not rejected at the significance level of 0.05. So there is no significant interaction effect on digital literacy.

Figure 2: Digital literacy across sectors and income

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. anova DigitalLiteracy Sector Income Income#Sector

                           Number of obs =       226     R-squared     =  0.1721
                           Root MSE      =  .821193     Adj R-squared =  0.1416
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Source	Partial SS	df	MS	F	Prob > F
Model	30.4147726	8	3.80184658	5.64	0.0000
Sector	10.8390027	2	5.41950134	8.04	0.0004
Income	6.35164827	2	3.07582413	4.56	0.0115
Income#Sector	5.61794533	4	1.40448633	2.08	0.0841
Residual	146.335504	217	.674357161		
Total	176.750277	225	.785556785		

Source: Self Produced

Hypothesis 6 focuses on the difference in digital access among different income levels, hypothesis 7 focuses on the difference in digital access among different sectors of occupation and hypothesis 8 focuses on the interaction effect on digital access of different income levels and sectors of occupation. The 2 way ANOVA table in figure 8 shows that the sectors have a P-value of 0.8403 which means that the null hypothesis is not rejected and there is no significant difference in mean values of digital access across different sectors. Figure 3 shows that the income has a P-value of 0.0000 which means that the null hypothesis is rejected and there is a significant difference in mean values of digital access across different income levels. The P-value of 0.0253 of the interaction effect of income level and sector of occupation means that the null hypothesis is rejected at the significance level of 0.05. So there is a significant interaction effect on digital access.

Figure 3: Digital access across sectors and income

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. anova DigitalAccess Sector Income Income#Sector

                           Number of obs =       226     R-squared     =  0.3167
                           Root MSE      =  .787315     Adj R-squared =  0.2915
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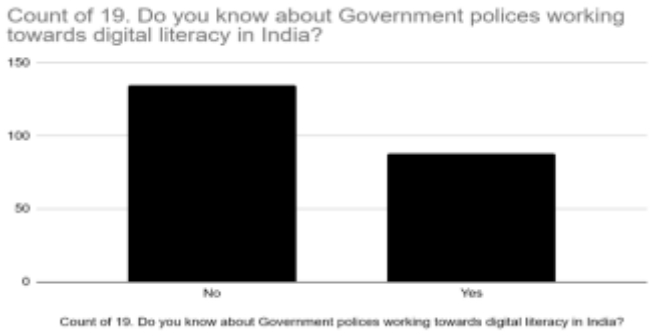
Source	Partial SS	df	MS	F	Prob > F
Model	62.340361	8	7.79254513	12.57	0.0000
Sector	.215843459	2	.10792173	0.17	0.8403
Income	41.6406099	2	20.8203049	33.59	0.0000
Income#Sector	7.03780633	4	1.75945158	2.84	0.0253
Residual	134.510579	217	.61986442		
Total	196.85094	225	.874893068		

Source: Self Produced

On the questions related to the know-how of government the government policies and its objectives. About 60.09% of females self-claimed that they don't know about the policies that the government has implemented for

digitalisation in the country. Only 38 females know about the Digital India Program, about 21 know about the Pradhan Mantri Kaushal Vikas Yojana and only 10 females know about the Digital Saksharta Abhiyan (DISHA). This shows the lack of reach of these policies to the females.

Figure 4: Responses to the information about government policies towards digital literacy



Source: Self Produced

According to the data of the 75th round of NSSO, There exists a huge digital literacy gap between males and females. A report by MOSPI in 2019 reveals that 8.5% of rural females have access to the internet which is almost half of their male counterparts. A study by Aggrawal in urban slums of Delhi reveals that 58% of females possess mobile phones which is very less as compared to males (90%). Out of this 58%, only 18% have internet connectivity. Research by Women's right online in 2017, finds out that only 46% of urban females in Delhi are using the internet against 90% of their male counterparts. These reports and data prove that female digital literacy is lower as compared to males and there is a huge digital gap that exists in the region.

Various obstacles hinder the access of women to ICT and create a gender digital gap in the region. The first reason is the low level of literacy among females as compared to males. Female literacy in Delhi is 80% which is 10 percentile points less than male literacy while in other regions of NCR female literacy is significantly less than male literacy. According to Quoting Antonio, A., & Tuffley, D. (2014), lower literacy is one of the reasons for the digital divide. The second reason is the financial constraint on access to ICT. Poverty in a region plays an important role in a low level of digital literacy and the digital gap. The book "Women-Education-and-Empowerment-in-India" by Barman, explains that affordability has a significant role in the gender digital divide. Due to a lack of income and wealth, a person can not afford a computer set and internet connectivity. An MSI report in 2019 reveals that females earn 19% less than males which means that women with lower income as compared to men can not afford access to ICT. The patriarchal society also acts as a barrier as proposed by the study by Chetty, K., Aneja, U., Mishra, V., Gcora, N., & Josie, J. (2018). Society thinks that mobile phones, computers and the internet will have a bad impact on the mindset of women so they deny their access to ICT. To solve the problem of the gender digital divide, the Government of India and some NGOs have started various initiatives. In 2006, the government started a national e-governance plan which includes 41 mission mode projects focused on women and child development, social benefits, education and health etc. Then in 2015, the government launched the Digital India program. The program focused on ensuring that each citizen should get government services online. To ensure this, the government will focus on providing better infrastructure, digital literacy and the internet. In October 2017, the government launched a program "Pradhan Mantri Gramin Digital Saksharta Abhiyan" which focuses on enhancing digital literacy in rural areas. It aims to reach about 40% of rural households. In 2014, the National digital literacy mission was launched to provide IT training to Anganwadi, ASHA workers and ration dealers. This mission aims to provide training to at least one member of each household in 2 phases. An NGO from Gujarat, SEWA, has started a program for women whose main focus is capacity building, generation of livelihood and knowledge sharing through the use of ICT. Despite many such initiatives by the government and NGOs, women's digital literacy is still a major problem in India. There are very few initiatives that directly focus on women's digital literacy and bridging the gender digital gap.

Conclusion

This study concludes that females have unequal access to ICT in the Ghaziabad region and the gender digital divide is there in the region. The data shows that 74% of the female population has less than the average value of digital literacy in Ghaziabad, signifying the lack of digital know-how amongst the marginalized. Whereas only 32.3 % of the females have digital access. Thereby reflecting the dearth of digital access amongst individuals. The study shows that there are significant differences in digital literacy among different income groups and different occupational sectors. In the case of digital access, income groups show differences but there is no significant difference among the different occupational sectors. The study shows the lack of reach of government policies toward the females of Ghaziabad. It is significantly clear that females can indulge in ICT but due to various socio-economic reasons they do not have access to or are denied access to ICT. This unequal participation of women in ICT harms the community as well as the personal level. It has been observed that education can play an important role in removing the gender digital divide. A female who has at least completed her matriculation has a higher chance to engage in technologies and opportunities associated with it, while the uneducated female has a lower chance to engage in technologies and related opportunities, regardless of their access to them. There can be many reasons for this: low literacy, patriarchal society, and affordability. Many initiatives broadly focus on digital literacy for everyone but in particular, they do not address the gender digital divide and the low level of women's digital literacy and their access to ICT.

Limitations of the study

- There is very little secondary data available for the Ghaziabad region.
- The number of reports and studies for the Ghaziabad region is not significant.
- The gender-based data are not available for various initiatives.

Recommendations of the study

- There should be special arrangements for women to acquire digital literacy and digital access..
- It is important to evaluate the benefits of enhancing the digital literacy and digital access of women for the economy and society as a whole.
- More policies should be introduced which specifically focus on female digitalisation.
- The existing training centres should be efficiently and effectively used for women's training.
- There should be separate time slots for women's training.
- The environment should be safe and non-threatening for women trainees.

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