Digital Inequity and Knowledge Divide among Intersectional Identities

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Abstract

In the 21st century, the development, distribution, and utilisation of knowledge are crucial and digital equity is a prerequisite to building an egalitarian knowledge society. Nearly 9 per cent of students enrolled in any course had access to a computer with the internet, according to NSS data. Only 25 per cent of the total number of registered students had access to the internet via any type of gadget. More than 40 per cent of students in the Northeast region of India were devoid of any digital tools to attend online classes during COVID-19, according to the NAS report 2021. According to 'India Inequality Report 2022: Digital Divide' released by NGO Oxfam India, barely one-third of Internet users are women. The existing global digital inequity widens the knowledge divide between the haves and have-nots. As a result, sociotechnical discrepancies are often magnified leading to the emergence of diverse forms of social exclusion, marginalisation and vulnerabilities. Intersectional discrimination acknowledges social disadvantages result from the intersection of multiple social identities. The purpose of the study is to reveal the variations in digital accessibility across different intersectional identities and identify the potential barriers in our schools and society that impede students' legitimate digital access. The study has indicated that access to digital infrastructure and devices has created a significant disparity between students from different socio-economic and caste groups, making online learning difficult for many.

Keywords: *Digital inequity, digital equity, egalitarian knowledge society, social exclusion, marginalisation, digital divide, intersectional identities*

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Introduction

Digital inequity is the disparity in access, knowledge and ability to use digital tools and technology, particularly harming lower income individuals and minority communities. The concept of the 'digital divide' emerged as a result of increasing concerns about access and knowledge inequality as a result of the widespread use of digital technologies. The differences between prosperous and poor, urban and rural locations, and various castes and religious groups are prominent instances of India's digital divide. The most marginalised populations are left behind as a result of this digital divide, which only serves to exacerbate the socio-economic disparities already present in the nation. Access to basic services might get impeded by the gap, worsening existing present inequalities.

The influence of the digital divide on inequality in India during the pandemic is discussed in the India Inequality Report 2022: Digital Divide by Oxfam. Digital inequality is not restricted to access to the technical infrastructure, but also to the social infrastructure that supports ICT (Rooksby, Weckert and Lucas, 2002). This includes socio-demographic factors such as income, gender, race, ethnicity, education, age and location, as well as the institution (Choudrie et al., 2005). Digital inclusion and seclusion simultaneously received great attention in developing countries for assisting policy formulation as a tool to address different forms of socio-economic inequalities and marginalisation (Sharma and Banerjee, 2022).

It examines the lack of access to ICTs as one of the main factors contributing to the divide and highlights the fact that roughly 70 per cent of people have either poor or no connectivity to digital services. Government initiatives like Bharat Net, which aims to offer digital connectivity in rural India, have also been ineffective in achieving their objectives. Only 2.7 per cent and 8.9 per cent, 20 per cent have access to computers and internet services, respectively.

The study also focuses on the environmental, social and political aspects that influence who uses the internet and for how long. While digital learning platforms have been promoted as the way to the future in India, a sizeable portion of our population still lacks the tools, infrastructure and digital literacy needed to benefit from digital education. Unfortunately, marginalised groups are frequently the ones who are least connected to the internet. Due to the lack of connectivity and overlap of low socio-economic communities, the digital gap is particularly pronounced in rural and semi-urban areas of the country. While the National Education Policy (NEP-2020) emphasises the importance of digital learning, numerous steps must be taken to fulfil the goals of the policy and change

the learning environment in India. As a result, a variety of comprehensive strategies for the widespread adoption of digital literacy are advocated by specialists in the field of digital learning.

The digital divide is not a new issue for academics and practitioners but it remains a fruitful research topic due to its impact on society and on economic development. Despite persistent initiatives to incorporate digital technology into primary, secondary and higher education institutions. The current crisis has highlighted the urgent need to address the issue of insufficient access to digital infrastructure in nations like India. Unfortunately, a sizeable majority of Indian students still lack access to fundamental digital resources like devices and internet connectivity, making online learning difficult.

Rationale of the Study

Digital inequities refer to an individual's inability to access information communication technologies (ICTs) in daily life as experienced by a lack of digital devices, affordable broadband or the know-how (i.e., digital literacy) to use evolving technologies (National Digital Inclusion Alliance n.d.). Digital inequities are intersectional (Crenshaw 1989; Ireland et al. 2018; Tsatsou 2021; Bastick and Mallet-Garcia 2022), meaning that people of multiple marginalised social identities, particularly regarding race, class and gender in America, experience digital inaccessibility and illiteracy at higher rates across social environments (Bronfenbrenner 1992) that impact employment and earnings (Martínez and Gayfield 2019). Digital inequities are pervasive barriers to work in communities where populations experience intersectionality because they reinforce existing inequities by contributing to localised norms where examples of society's increased digitisation are often limited to practices of consumption (i.e., communication, entertainment) rather than practices associated with ICT-based work or business practice (Ireland et al. 2018; Vargas-Solar 2022; Mobarak and Saldanha 2022)

Digital equity and inclusion matter at every level of education, from early childhood, primary and secondary to higher education. It is also vital for adult education and lifelong learning as society becomes more digitalised. While considering diversity and inclusion is essential at each stage, this paper focuses on the evidence and policies most relevant to compulsory education at the primary and secondary levels. It highlights how different digital tools, ranging from computers, tablets and mobile phones to more innovative and emerging technologies can be used to promote and support learning outcomes for all students.

However, challenges remain and there are inequalities in digital access both within and between countries.

Around the OECD, education systems report several barriers to enabling adequate access to digital technologies including geographic distance (for example, challenges in equipping more rural areas with broadband), lack of equipment in schools and socio-economic inequalities (Burns and Gottschalk, 2019). Specific student groups such as, Roma students in Europe, for example, tend to lack access to internet or when they do have access, it is sporadic (Garmendia and Karrera, 2019). Socio-economic disadvantage constitutes a common barrier to access and in families with parents from higher socio-economic status (SES) backgrounds there tends to be a higher variety of devices available in the home. Ensuring individuals have digital access can help them feel more confident about actively participating in everyday educational activities. Some research suggests students report an increased ease in completing schoolwork and communicating with friends when this barrier in access is overcome (Yelland and Neal, 2012). Without connectivity, devices and the requisite digital skills, students will face additional obstacles to digital inclusion and to benefiting from digital opportunities. Digital inequalities or digital divides operate across different levels. To use digital tools to promote equity and inclusion, these divides need to be taken into account and mitigated. The first-level digital divide refers to the difference in access to digital technologies (Van Deursen and Helsper, 2015).

In recent years, many OECD countries have seen a closing of this gap between those who have access to suitable devices and quality broadband internet connection, and those who do not (Burns and Gottschalk, 2019). 'Digital inequality stack' is a recently coined term that suggests the different layers of digital divides or inequalities are stacked and interdependent (Robinson et al., 2020). It also highlights the loop of digital inequalities and social inequalities, whereby digital inequalities can both amplify and reinforce social inequalities. Therefore, focusing on ways in which equity can be achieved in the digital domain but also how digital technologies can be used to promote equity and inclusion in offline spheres is important. Removing barriers and ensuring individuals can maximise the benefits can help education systems become more digitally equitable and inclusive.

PISA 2018 reports that while the majority of principals felt that schools had appropriate digital capacity, there is much room for growth, especially in the areas of learning platforms and technical support staff. More than 30 per cent of principals reported that teachers did not have the necessary training in the pedagogical applications of digital tools. According to school leaders who participated in The OECD's Teaching and Learning International Study (TALIS) 2018, 25 per cent

reported a shortage or inadequacy of ICT as hindering the provision of quality instruction. Although internet penetration in the country has been increasing steadily over the past few years. Towards achieving the goal of providing broadband for all citizens, the government is implementing the flagship Bharat Net project in a phased manner to provide broadband connectivity to all the 2,50,000 Gram panchayats of the country. Amidst various constraints in the region such as difficult terrain, scattered habitations and insurgency, there is a lack of mobile connectivity in certain parts of the northeast region and the government has already initiated a series of telecom projects to provide mobile services throughout the region. There are 2805 villages in Arunachal Pradesh yet to be covered by mobile connectivity, 2503 in Assam, 528 in Manipur, 2374 in Meghalaya, 252 in Mizoram, 134 in Nagaland, 23 in Sikkim, and two in Tripura.

As access to and content in the ICTs have evolved over the years, so has the definition of the digital divide. Now it is regarded as (i) lack of infrastructure; (ii) lack of access; (iii) lack of information, and (iv) inability to leverage information. There are considerable differences in the definition of digital exclusion by various researchers.

For some, the term refers to the gap between people who have access to the Internet and those who don't (Mehra, 2002); and the extent of physical access to ICTs and the internet. According to OECD, (2001), the term digital divide refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels about their opportunities to access information and communication technologies (ICTs) and their use of the Internet. It reflects differences among and within countries. More than 40 per cent of students in the Northeast region of India were devoid of any digital tool to attend online classes during COVID-19, revealing a National Achievement Survey (NAS) 2021. The survey revealed that only 16 per cent of teachers in Assam had access to adequate instructional materials and supplies, and 16 per cent of schools had sufficient audio-visual resources. Manipur was 16 per cent in both categories. The figures for other states were— 10 per cent and 12 per cent respectively in Meghalaya, 14 per cent and 11 per cent for Mizoram, 13 per cent and 15 per cent for Nagaland and 19 per cent and 28 per cent for Tripura. In Arunachal Pradesh, only 17 per cent of the teachers surveyed had adequate instructional materials and supplies, and only 23 per cent of schools had sufficient audio-visual resources.

Drawing on the thought of Max Weber, the digital divide simply extends traditional forms of inequality, it also includes new forms of social exclusion or perhaps manifests counter-trends that alleviate traditional inequalities

whilst constituting new modalities of inequality. The digital divide manifests counter-trends that alleviate traditional inequalities whilst constituting new modalities of inequality. With attention to how social stratification in the digital age is reproduced and transformed online, Weber develops an account of stratification as it exists in the digital sphere, advancing the position that, just as in the social sphere, inequalities in the online world go beyond the economic elements of inequality. As such, the study of the digital divide should focus not simply on class dynamics or economic matters, but cultural aspects such as, status or prestige and political aspects such as, group affiliations. The extent to which new digital technologies offer new opportunities to improve people's social lives. It focuses on the opportunities to improve the life quality of citizens or users offered by information communication technologies (ICTs) and these opportunities' links to pre-existing forms of social stratification. It explores the reciprocal effects that social and digital inequalities have on each other, emphasising once again that digital inequalities tend to reinforce the social inequalities upon which they are based. Current society can be represented as a digital network in which some of the most important human and social activities occur and exclusion from or limited access to the digital realm become a major source of social inequality. Those who have greater digital capital are more likely to convert their use of the internet into economic, social, cultural, personal and political capital. Third digital divide with respect to social inequality explores how online activities and digital skills vary according to crucial sociological dimensions, explaining these in concrete terms in relation to the dynamics of social class, social status and power (Ragnedda, 2017).

Considering the negative effects of the digital divide on the economically disadvantaged and other marginalised groups, researchers have referred to the problem of the digital gap as a critical issue for social justice in the modern era (Resta and Laferrière, 2015; Rogers, 2016). The issue is present across the globe and continues to be an area of social concern (Resta and Laferrière, 2015). While universities and other higher education institutes are considered as the key sources of skilled workforce upon which a knowledge society is built, the significance of ICT becomes more vivid in education institutes to help build a knowledge society, making students' and faculty's ICT access an important area of investigation. Furthermore, the studied literature indicated that 'digital divide' has been approached from other areas of knowledge such as, from the perspective of gender, pedagogy, educational subjects but haven't been explored from the intersectional

viewpoint. Therefore, assuming the extension of access to be homogeneous is an error. Digital exclusion is a serious problem, affecting half of humanity.

An intersectional perspective provides a powerful lens for examining state's obligations to ensure digital equity across gender, disability and socio-economic status. Accessibility, cost, affordability, and social marginalisation, etc, are some of the examples of intersectional barriers. The objective of this study is to assess the extent of digital inequity among different intersectional identities. Three dimensions— (i) Access to digital tools and resources, (ii) Access to Internet connectivity, (iii) Access to tech-savvy educators have been utilised to assess the extent of digital inequity in North East India. It is well known that North East India has the highest tribal population in the country. However, through the lens of intersectionality, this distinct social identity can further be fragmented into multiple overlapping identities on the basis of race and ethnicity, low and high family income, rural and urban background, government and private schooling of children, etc. It is necessary to understand these gaps from an intersectional perspective because it is not only a difference in access to equipment but also required a set of skills and knowledge which is found to be very insufficient among various intersectional groups of society because of unequal distribution of opportunities.

In the mid-2000s, research on the digital divide moved beyond physical access and paid closer attention to concepts that are concerned with issues around culture, empowerment, and social mobility; and differentiated uses of the internet (Hargittai, 2002; de Haan, 2004; Newhagen and Bucy, 2004; van Dijk, 2006). Against a general conception of 'digital inclusion' as access to computers and internet for all, regardless of physical, cognitive or financial ability, Crandall and Fisher (2009), broaden the definition to include technological literacy and the ability to access relevant online content and services. They also see it as the process of democratising access to ICTs, in order to allow the inclusion of the marginalised in the information society. Hache and Cullen (2009) further state that digital inclusion should be seen as a wagon to social inclusion that ensures individuals and disadvantaged groups have access to ICTs and the skills to use them and are therefore, able to participate in and benefit from an increasingly electronically mediated knowledge economy and information society. To fill previously noted gaps in the literature about intersectional digital divides that appear in communities, a research question was posed in this study:

- What is the extent of digital inequity among different intersectional identities in terms of access to digital tools and resources, access to internet connectivity, and access to tech-savvy educators?

Objectives

To study the extent of digital inequity among different intersectional identities in terms of access to internet connectivity and access to tech-savvy educators.

Hypotheses

The following null hypotheses were formulated to achieve the Objectives of the study:

There is no significant difference in digital inequity among different intersectional identities in terms of access to digital tools and resources, access to Internet Connectivity, access to tech-savvy educators concerning demographic variables that is (i) Gender (ii) Locality (iii) Socio-economic status

Research Methodology

Method

A descriptive survey method was used to achieve the objectives of the study.

Participants: 130 school students were selected through a purposive sampling technique from three private and public schools of North East region in India. The purposive sampling technique has been used because the researcher has a clear idea of the characteristics and attributes of the sample chosen for the study. The age group of the selected sample was from 19–25 years.

Instrument: The tool consists of three sections A, B, and C. In the first section, demographic information was asked by the participants. In the second section, 39 items based on the a five-point Likert's scale (from strongly agree = 5 to strongly disagree =1 and YES/NO) was developed by the investigators and in the third section three open-ended questions were asked to collect the data from participants. However, after receiving the feedback of the expert, 40 items out of 50 items and three open ended questions were finalised for the try-out phase. After an item analysis procedure, one item was rejected. However, one item was modified and included in the questionnaire. Hence, 39 items out of 50 items were finally included in the scale. The tool consisted of two measuring instruments in which one is based on the five-point Likert scale and YES/NO answer type questions with 39 items and the second is a questionnaire type with three open-ended questions. The scale has three dimensions namely access to digital tools and resources, access to internet connectivity, and access to tech-savvy educators.

Reliability of the Tool

Cronbach's alpha (coefficient α) is used to calculate the reliability coefficient of the tool along with dimensions. The reliability coefficients of the three dimensions namely access to digital tools and resources, access to internet connectivity, access to tech-savvy educators and were found to be 0.80, 0.77 and 0.5, respectively. Based on internal consistency analysis, the reliability coefficient of

the entire scale was found to be 0.91. This value indicates good internal consistency of the items. Hence, the scale was considered to be highly reliable.

Validity of the Tool

The content validity of the tool was established through the experts' judgment. Three experts from the University— one a sociologist, the second an ICT Expert, and a language expert reviewed all items of the tool by considering the fundamental aspects like content, items, language, vagueness, length, dimensions, etc. After receiving the experts' feedback and using item analysis, a minor revision was applied to the tool to improve its validity to the research questions of the study. Thus, 39 items and three open-ended items were found to be appropriate for the final draft of the tool.

The Procedure of Data Collection

First, permission was taken from the concerned authorities of the concerned schools; thereafter, the investigator administered the tool through online mode to collect the data from the concerned participants. Participants were fully informed about the purpose of the study before the distribution of the tool. Besides this, they were invited to participate in this study voluntarily and were allowed to withdraw from the study at any time. After establishing a rapport with the participants, all required instructions were given very clearly in the tool. All the procedure of data collection was completed in seven days in September 2023.

Statistical Analysis

Descriptive statistics like mean, SD, t-test and the sampling procedure both are required to choose the appropriate statistical procedure for analysing data.

Result and Discussion

The faculty's physical access to digital tools and resources was measured through a checklist comprised of various digital devices, software, etc. Respondents were asked to report whether they had access to the devices given in the list at home and on-campus Fig. 1 presents the status of the physical access to digital tools and resources among several intersectional identities have been taken into consideration like— male or female, rural or urban, APL or BPL and tribal or non-tribal at home or on-campus. The table shows that about 95 per cent of male students have access to digital devices and resources, whereas about 100 per cent of the female students have the physical access to it. About 91 per cent students from rural region have access to digital devices compared 100 per cent students from urban region. About 97 per cent APL students can access to digital devices compared 86 per cent BPL students. About 81 per cent tribal students

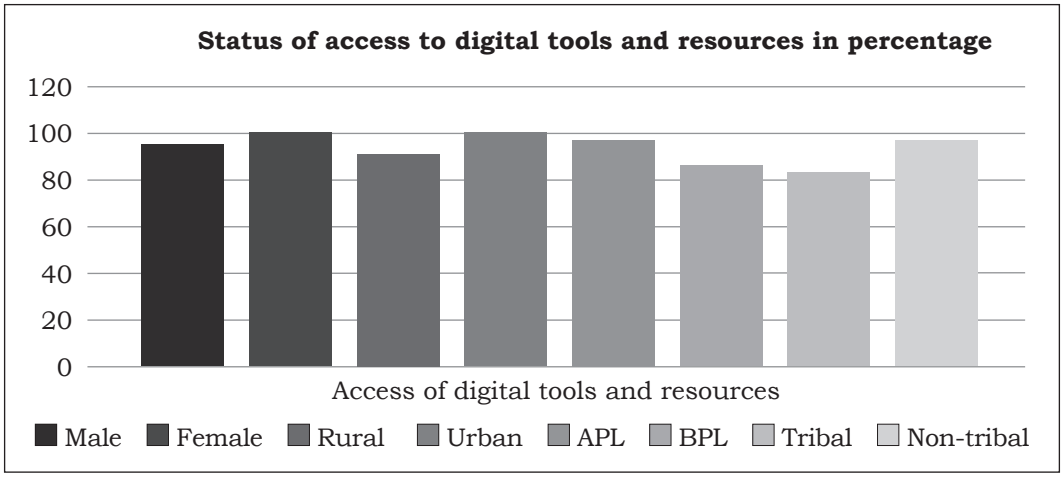

Fig. 1. Comparison of the status of access to digital tools and resources with respect to their intersectional identities

have the priviledge to access digital devices compared 95 per cent non-tribal students. As depicted in Fig. 1, there are a few technologies including mobile phones, computer which were accessible by most of the participants having multiple intersectional identities. On the other hand, some digital devices such as, tablet, video and statistical software, learning management system, etc, were accessible by a small proportion of students.

UNESCO accepted the gender divide as 'one of the most significant inequalities to be amplified by the digital revolution' (Primo, 2003). Table 1 reveals that α- level at 0.05 is greater than the p-value, i.e., 0.02. Therefore, it can be interpreted that there is a significant difference between the access of internet connectivity and tech savvy educators among male and female. Chen and Wellman (2004) also found that gender is one of the important factors affecting the internet connectivity. Males are more likely than females both to access and use of internet.

Table 1: Comparison of the Status of Access to Internet Connectivity and Tech Savvy Educators with Respect to their Gender

S. No.	Gender	N	Mean score	df	α- level	p-value	Result
1.	Male	78	70.1	34	0.05	0.02	Significant
2.	Female	52	79.62				

Table 2: Comparison of the Status of Access to Internet Connectivity and Tech Savvy Educators with Respect to Locality

S. No.	Locality	N	Mean score	df	α- level	p-value	Result
1.	Rural	75	70.88	27	0.05	2.05	Not Significant
2.	Urban	55	79.08				

Table 3: Comparison of the Status of Access to Internet Connectivity and Tech Savvy Educators with Respect to their Class

S. No.	Class	N	Mean score	df	α- level	p-value	Result
1.	APL	56	75	32	0.05	0.37	Not significant
2.	BPL	74	71.4				

Table 2 reveals that α- level at 0.05 is lesser than the p-value, i.e., 2.05. Therefore, it can be interpreted that there is no significant difference between the access of internet connectivity and tech savvy educators among male and female.

Table 3 reveals that α- level at 0.05 is lesser than the p-value, i.e., 0.37. Therefore, it can be interpreted that there is no significant difference between the access of internet connectivity and tech savvy educators among male and female.

Table 4 reveals that α- level at 0.05 is greater than the p-value, i.e., 0.02. Therefore, it can be interpreted that there is a significant difference between the access of internet connectivity and tech, savvy educators among tribal and non tribal. Sharma and Banerjee (2022) also found that inequality persist across social groups in the use of internet. Hence, the study established the multiple digital divides and exclusion among different intersectional identities.

Table 4: Comparison of the Status of Access to Internet Connectivity and Tech Savvy Educators with Respect to Tribal and Non-tribal Students

S. No.	Ethnicity	N	Mean score	df	α- level	p-value	Result
1.	Tribal	68	70.1	37	0.05	0.02	Significant
2.	Non-tribal	62	79.62				

Conclusion

Despite possessing the tribal identity substantially, the type of schools in which North East Indian students are enrolled, i.e., both government and private schools have been taken into consideration to anticipate the extent of digital divide among intersectional identities across pan India level. As depicted in Fig. 1, there are a few technologies including mobile phones, computer which were accessible by most of the participants having multiple intersectional identities. On the other hand, some digital devices such as tablet, video and statistical software, learning management system, etc, were accessible by a small proportion of students. The study also revealed that many teachers lack the necessary devices to deliver education digitally, indicating a lack of preparedness. The digital divide has significant consequences for education, particularly in developing countries like India. The gap in access to digital infrastructure and devices has created a significant disparity between students from different socio-economic and caste groups, making online learning difficult for many.

The investigation of the digital divide is not limited to the adoption and diffusion of ICTs, public policy and regulation, but rather it is also linked to the issue of e-government, ICTs index and e-readiness and alternative technologies for bridging the digital divide. The internet is the most common technology studied. Several factors are presented and their relationship to the digital divide is indicated in the study. Several types of ICTs were investigated, both from empirical and conceptual standpoints. The digital divide in access were discussed on three dimensions— access to digital devices and resources, access to internet connectivity, access to tech-savvy educators by employing a quantitative method, either survey or data analysis, as the main method. The findings show that the diffusion of wireless technology or other alternative technologies would be helpful in narrowing the digital divide. The study outlines a series of measures that can be implemented to tackle the challenges arising from the digital divide. To bridge the digital gap, the first step is to tackle the primary reason for it, which is financial disparity. This can be accomplished by enhancing the earnings of the underprivileged, delivering comprehensive education facilities. The second step is to make sure that internet connectivity is available in distant and rural regions, which can be accomplished through communal networks and publicly accessible Wi-Fi internet entry points. Similar findings are also supported by different research studies (Ireland et al. 2018; Vargas-Solar 2022; Mobarak and Saldanha 2022). They had also revealed that digital inequities are pervasive barriers to work in education where populations

experience intersectionality because they reinforce existing inequities by contributing to localised norms where examples of society's increased digitisation are often limited to practices of consumption (i.e., communication, entertainment) rather than practices associated with ICT-based education, work or business practice.

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