

Assistive Technologies and Mass Media: An Empirical Study on the Influence of Their Usage and Consumption on Persons with Disabilities in Ahmedabad

Parth Shastri

Faculty of Journalism and Communication
The Maharaja Sayajirao University of
Baroda, Vadodara
Email: shastri.parth@gmail.com

Prof. Niti Chopra

Faculty of Journalism and Communication
The Maharaja Sayajirao University of
Baroda, Vadodara

Abstract

The exponential rise of smartphones and devices in recent years has changed the way Persons with Disabilities (PwDs) interact with the world. India's Rights of Persons with Disabilities Act, 2016 recognizes the role assistive technology plays in the inclusion of PwDs in the mainstream. The present study encompasses the findings of four focused group discussions (FGDs) organized at four Ahmedabad-based NGOs working with disability spectrum including visual impairment, speech and hearing impairment and orthopaedic impairment to understand the usage of assistive devices by PwDs and its role in helping their assimilation in the society. Key findings pointed at a very high rate of smartphone usage by the PwDs for their daily activities and connect to the world, reliance on computer skills to find a good job and adopting new technologies for improved mobility. The 5As of Access – Availability, Accessibility, Affordability, Appropriateness and Acceptability – play a crucial role in the PwDs to adopt new technology. The respondents also pointed out the role of media and society at large to create inclusiveness and creating opportunities for the PwDs.

Keywords: Accessible India, RPwD Act, Disability, Persons with Disabilities, Assistive technology

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Introduction

India had 2.68 crores (26.8 million) PwDs as per Census 2011 data. To put the number in perspective, it's more than the entire population of countries like Australia and North Korea. PwDs consisted of 2.21% population in the last census. The number of PwDs in Gujarat was 10.92 lakh (1.09 million) as per the same statistics.

According to the analysis of 2011 census data for PwDs in the form of 'Disabled Persons in India: A Statistical Profile 2016' publication by the Government of India, the highest number of PwDs are recorded in 10-29 years. Out of the total, 55% (14.6 million) are illiterate, and only 36% are identified as 'workers.'

AT, ICT and Policy Framework

WHO (2001) defines assistive technology (AT) as 'any product, instrument, equipment or technology adapted or specially designed for improving the functioning of a disabled person.' As per Reed & Bowser (2005), it is 'any item, piece of equipment, or product system, whether acquired commercially off the shelf modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.'

It includes devices for low-vision, hearing impairment, walking frames, wheelchair, prosthesis and those using Information & Communications Technology (ICT). Assistive technologies play a significant role in enabling people with disability to access work, perform a daily routine for living and participate fully in the community (Cook & Polgar, 2014).

UNESCO mentions that at least 15 per cent of the world population today is living with disabilities. ICTs have the potential for making significant improvements in the lives of persons with disabilities, allowing them to enhance their social, cultural, political and economic integration in communities by enlarging the scope of activities available to them (ICTs for Persons living with Disabilities, n.d.).

Integration of the PwDs in the mainstream is a global issue and ICT can be employed as an equalizing factor for education and employment (Ullmann et al., 2018). Weber (2006) considered ICTs as 'gateway to a knowledge-based economy' and considered it critical for PwDs more than the general population because 'they lack alternative for the information retrieval or participation in general.'

India, being part of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) since 2007, introduced the Rights of Persons with Disabilities (PwD) Act, 2016 in December 2016. Section 29(g) of the Act upholds the right of PwDs to have a cultural life to participate in recreational activities equally with others. For the same, the Act recommends 'developing technology, assistive devices and equipment to facilitate access.' (Government of India, 2016a)

The UN General Assembly in 2013 noted that an estimated 80% of the PwDs live in developing countries and stressed need to include them in all aspects of development (WHO, 2015). Article 26 (Habilitation and rehabilitation) of the Convention stipulates that State Parties shall promote the availability, knowledge and use of assistive devices and technologies, designed for persons with disabilities, as they correlate to rehabilitation.

In India, the Rights of Persons with Disabilities (PwD) Act, 2016 was introduced in December 2016. The Act did not only improve the scope of disabilities but also shift focus from charity-based to rights-based initiatives for PwDs, ensuring their equal participation in democracy (Government of India, 2016b).

Need for new technology approach and roadblocks

Global protocols such as the Web Content Accessibility Guidelines (WCAG) 2.0 by the World Wide Web Consortium (W3C) already recommends some tools to make the website more accessible. Also, the Government of India under its Accessible India (*Sugamya Bharat*) initiative, has already instructed all the departments to follow the guideline.

The Global Initiative for Inclusive ICTs (G3ICT) terms accessibility measure as the extent to which a product or service can be used by a person with a disability as effectively as it can be used by a normal person. (Magennis, n.d.).

However, mere rules might not get translated into practice – ICTs are difficult to access by PwDs in low and middle-income countries that pose a challenge for their fuller socio-economic participation. Availability of access to ICT is determined by the nature and components (individual, social, financial and government actors) of its ecosystem (Samant, Matter & Harniss, 2013).

India, with a population of over 100 million PwDs, represents a scalable commercial opportunity of Rs 4500 crore for assistive devices (Debroy, 2016). With over 75% population in India using mobile phones, it could be an effective tool to reach out to the PwDs for the government agencies and others to understand their issues, offer solutions and engage them in fruitful dialogue to increase their participation to society and democracy at large.

The objective of the study

The present study is aimed to assess the usage of assistive technologies among persons with disabilities, primarily the school and college-going students, in Ahmedabad. The study includes qualitative methods to understand whether the use of assistive devices such as mobile phones and computers affect their self-image, assimilation in society and finding employment opportunities. The study also intends to assess the participants' perceived role of mass media.

Outline of the study

1. Introduction
2. Review of Literature
3. Research Purview & Methodology
4. Findings & Discussion

5. Conclusion

1. Review of Literature

Conceptual framework

The theoretical underpinning of this research is based on the social model of disability (Shakespeare, 2006; Oliver, 2013) as the theoretical framework. This model, against the medical model of disability (Retief & Letšosa, 2018), identifies disability as a social construct of barriers – both mental and physical – exclusion and discrimination based on a person's body. Thus, a person in a social model is a person with disabilities' instead of 'disabled' as described by the medical model.

A new discipline of STS (science, technology and society) studies looks at the technology such as assistive devices as active players in shaping action and identity of the users (Winance, 2006). Earlier, the devices such as wheelchair or hearing aid were very much part of the 'medical discourse' of the disability (Woods & Watson, 2004). But the new paradigm, under the social model of disability, pays more attention to how to change built and attitudinal features of environments that impede people's participation (Ravneberg & Söderström, 2017).

Need for digital inclusion and assistive devices

The Biwako Millennium Framework (BMF) covering Asia and Pacific regions has made Information and Communication Technology (ICT) accessibility one of the seven priority areas – formulating binding policy for developers to ensure accessibility of content. However, a study conducted by Bengaluru-based Centre for Internet and Society (CIS) in August 2012 mentioned that out of 7,800 websites tested, the majority had accessibility issues (Accessibility, n.d.).

Neirling et al. (2018), mentioned that assistive technology has a major role to play to create a level playing field. Citing relatively similar scenario over a century, the researchers mentioned that 20% of the blind and 40% of the deaf persons (sic) had

some gainful occupation in the US during 1906. In 2016, only 18% of PwDs were employed – three times lower than the national average of 66%.

Mobile phones for the PwDs

Along with improving communication with family and friends, mobile phones are also facilitating better communication at work between persons with disabilities and their peers (Raghavan, 2018). Means of communication on digital devices is based on visuals (text and images) that provide the possibility to those with hearing impairment to conceal their handicap from others (Barak & Sadovsky, 2008).

While India-specific data on mobile use among PwDs is not available, Morris et al. (2017) mentioned based on 2012-13 and 2015-16 data that the PwDs engagement with the core activity of cell phones was the same as the general population of the US, albeit with some variation on specific activities. For both sets, the mobile phone was a critical tool was independence, community participation, employment, education and more. While it doesn't mean that the barriers have been overcome, it suggests that the technologies constitute critical tools for all individuals, especially for PwDs.

Computers and mobile phones, which were earlier termed to be a challenge for PwDs are now generally considered equalizers of opportunities, familiarity with which improved employability of PwDs – provided by participation in the global economy (Thompson, 2018).

ICT challenges

Before large-scale implementation, issues of availability and affordability crop up. Provision for services is challenging for settings in which resources are scarce and infrastructure is inadequate. It sometimes leads PwDs to abandon technology (Borg, Lindström & Larsson, 2011; Alper & Raharinirina, 2006).

In the Asian context, researchers point out the need for awareness. In a study conducted by Wong, Meng Ee & Cohen (2011) to understand the use and implementation of assistive devices in Singaporean schools, it was found that access to

assistive technology was not adequate as school practises were inconsistent in how it is used and delivered to complement teaching and learning.

While the majority of public infrastructure such as libraries lack assistive technology in India (Sanaman & Kumar, 2014), the challenge also comes from lack of information. After a study of West Bengal-based schools for children with disabilities, Pradhan & Samanta (2018) mentioned that the schools did not know about assistance available from central and state government or regulations and policies governing them. They strongly recommended the use of assistive technology to improve the level of education in these schools.

Opportunities offered by assistive technologies

PwDs can enhance inherent abilities with assistive technology to give them access to a better quality of life. Completion of post-secondary education including vocational-technical training significantly improves chances of securing meaningful employment for PwDs. Successful use of technology plays a critical role in preparing youths with disabilities for further education. (Lancioni & Singh, 2014; Stodden, Conway & Chang, 2003)

Borg, Lindström & Larsson (2011) mentioned that the use of assistive devices improves mobility, health and quality of life – in turn increasing opportunities. New technologies are also improving the effectiveness of rehabilitation services provided to people with disabilities (Cooper, 1999).

While few studies throw light on the mass media consumption of persons with disabilities, research throws light on adoption of mobile phones to act as assistive technology – with screen reading technology, GPS, health service delivery, education & learning and so on (Goggin, 2011; Doughty, 2011). The persons with hearing impairment are using the video services for signed communication (Cavender et al., 2008) along with SMS (Okuyama, 2013).

Morris, Mueller et al. (2013) and Hollier (2013) indicate the role of assistive technology in bridging the digital divide and making information, which was earlier inaccessible, available. A study by Ellis, Kent et al. (2018) indicated that the majority of the interviewers acknowledge their smartphones as an essential requirement to navigate urban spaces.

Some of the examples of how technology can be enabler could be an audio description of graphic and visual media, screen and text magnification, subtitles for videos, use of text alerts, text messaging, mobile apps and online resources to access information (Raja, 2016).

Mass media are also realizing the potential. A Reuters Institute report (Aneez et al., 2019) on India indicated that 68% of respondents identified smartphones as their primary device for consuming news - which was higher than Brazil or Turkey. Search (32%) and social media (24%) was used more than the direct media source (18%).

It's however not only the PwDs who are beneficiaries of new technology – integration of information technology and assistive technology has resulted in the emergence of 'smart technology' that is also providing access and usability to an ageing population (Agree, 2014). Technology such as screen readers is also used by those for whom English is not their native language whereas screen enlargers are used by the elderly (How does rehabilitative technology benefit, n.d.).

Role of policies

The US Congress in 1990 passed the Americans with Disabilities Act (ADA), a civil rights law, to protect PwDs from discrimination. It heavily influenced the emergence of mobile assistive technologies having the potential of unlocking unprecedented new possibilities for communication, navigation and independence (Greenemeier, 2015).

Studies (Neirling et al., 2018) have found that PwDs have an open and optimistic attitude towards new and emerging technology. The focus area thus should not only be

the technical development but also sound implementation and social embedding of tools that already exist.

2. Research Purview and Methodology

Focused Group Discussion (FGD) was employed as the primary methodology for the qualitative data collection on the subject.

A focus group is a group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research. As a research technique, the focus group employs guided, interactional discussion as a means of generating 'the rich details of complex experiences and the reasoning behind (an individual's) actions, beliefs, perceptions and attitudes' (Powell & Single, 1996).

FGD was chosen for this study to encourage the respondents to speak and reflect on the questions as a group for better insights compared to a questionnaire or personal interviews.

Four Ahmedabad-based organizations – The Blind People's Association (BPA) at Vastrapur, Andh Kanya Prakash Gruh (AKPG) at Memnagar, Deaf and Mute Society School (DMSS) at Ashram Road and Apang Manav Mandal (AMM) were chosen for a random stratified sampling of the participants.

The first two are special organizations for the visually impaired whereas DMSS works for speech and hearing impaired and AMM for those with orthopaedic impairments. These three categories were chosen due to their dependence on assistive aids and to understand how technology can augment it.

While other age groups were encouraged to participate, the focus was on 16-25 years as the research wanted to ascertain how students are preparing for the life outside campuses for differently-abled. The total number of respondents for the study was 81.

Focused group discussion methodology

At each of the institution, the coordinators were informed about the qualitative data collection methodology of focused group discussion (FDG). Except for AMM, the other three locations provided a classroom along with a moderator/ interpreter for the discussion. The moderator was chosen by the institute and was primarily a teacher or a staff member known to the respondents.

At AMM, their courtyard was used for the purpose and no interpreter was present as the respondents were having an orthopaedic impairment and they could understand the questions and respond on their own.

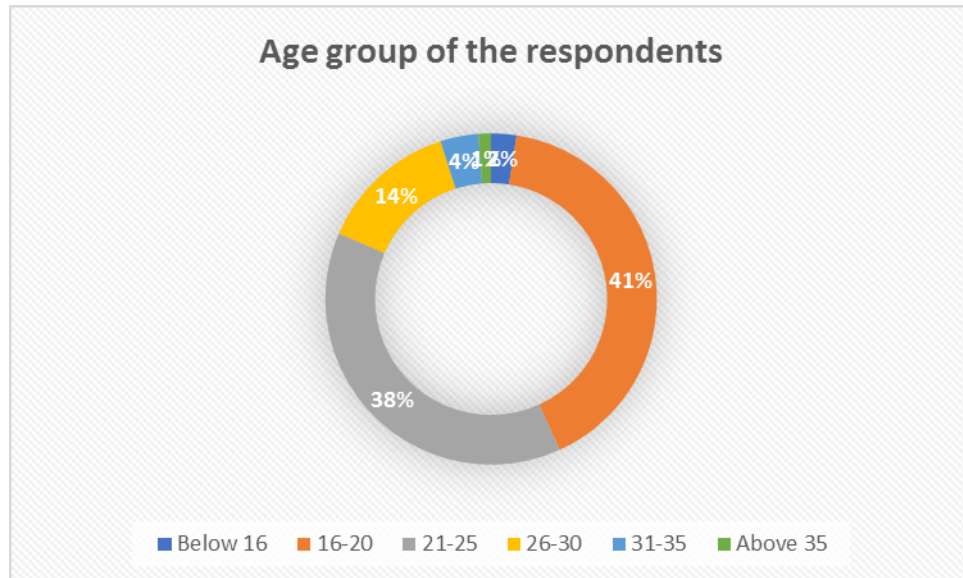
Each FDG lasted for 75 minutes to 90 minutes. Before the FDG, the respondents' data was collected, and they were briefed about the purpose of the discussion. The moderator then initiated the discussion by posing a question and inviting participants to reflect. At DMSS, two teachers – staff members at the school – interpreted the answers in sign languages by the students. At three other locations, oral answers were recorded.

In the end, major points of consensus were summarized for the participants for reflection.

Profile of the respondents

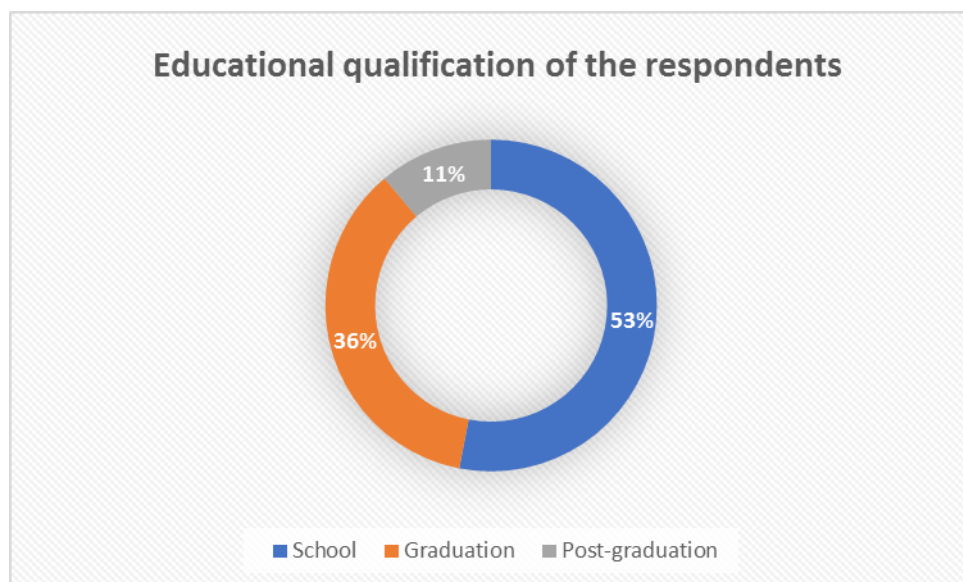
1.1 Age group

Out of total respondents, two were below 16 years of age, 33 in 16-20, 31 in 21-25, 11 in 26-30, 3 in 31-35 age groups whereas one respondent was above 35 years of age.



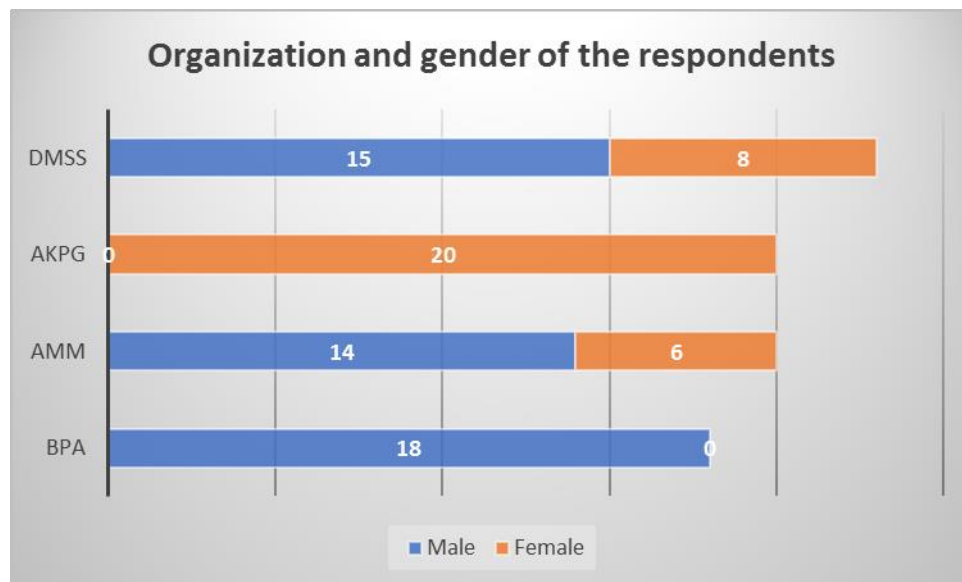
1.2 Educational qualification

A total of 43 respondents were pursuing their school education that included class 8 to 12 and at technical institutes offering diploma courses. Graduation courses, predominantly Bachelor of Arts (BA), along with Bachelor of Commerce (B.Com) and Bachelor of Education (B.Ed) was pursued by 29 respondents whereas 9 of the respondents were studying or had completed Master of Arts (MA).



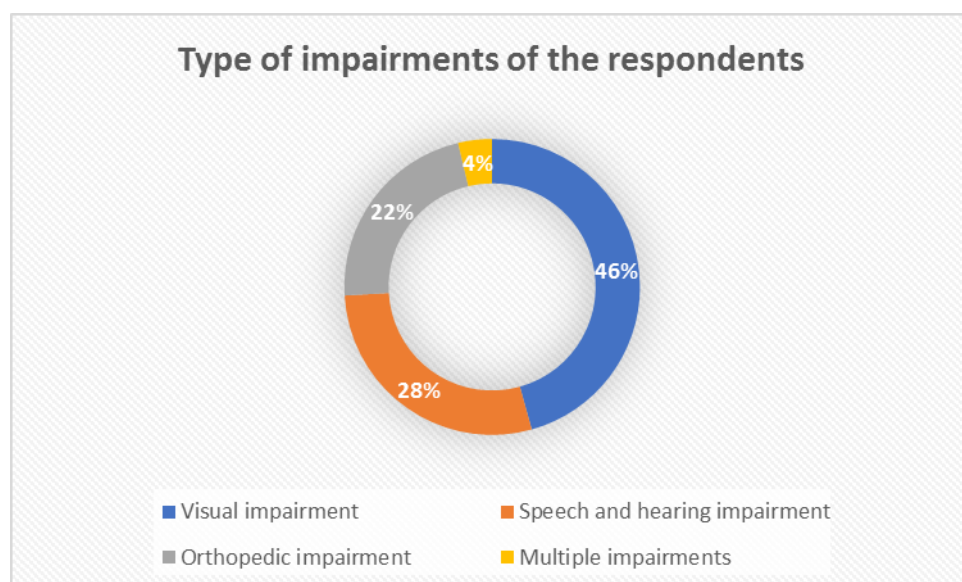
1.3 Organization and gender of the respondents

Out of 81 respondents, 47 were males and 34 were females. BPA had only male respondents whereas AKPG had only female respondents.



1.4 Impairments of the respondents

All the respondents at BPA and AKPG had visual impairment including low vision and partial blindness. All the respondents at AMM had orthopaedic impairments including polio, amputation, clubfoot and underdeveloped limb to name a few. All the respondents at DMSS had speech and hearing impairments. Three of the respondents reported multiple disabilities.



3. Findings and Discussion

Key discussion points from all the group discussions have been summarized below. Impairment and organization-specific findings are recorded separately.

Self-image: Except those respondents with visual impairment, both groups of speech and hearing impairment and orthopaedic impairment mentioned that they get conscious while interacting with 'normal' members of the society as their distinctive assistive aid – be it crutches, wheelchair or hearing device – immediately identified them as a person with a disability (PwD). The respondents mentioned that they did not like their whole identity to be based on their impairment and thus – especially in case of speech and hearing impairment – the respondents refrained from using one if not necessary.

Use of mobile phones: Except for two respondents with visual impairment and six with speech and hearing impairment, all mentioned that they possess and use mobile phones extensively in their daily lives. In addition to universal applications such as SMS, WhatsApp and emails, they installed special applications for better inclusion.

Visually impaired – TalkBack feature on Android phones enabled them to operate the phone by voice commands. For those with low-vision, applications such as Magnify provided an opportunity to read without anyone's help. The respondents also reported using online audiobook libraries extensively to prepare for examinations or leisure reading.

While one respondent at BPA narrated 'Be My Eyes' app where the blind can connect with the sighted through the camera – the volunteer on the other end can narrate what he/she sees to the person including the colour of their clothes to the signboard in front of them, another mentioned multiple applications that scan the currency notes and talk about the denomination. The latter application was widely used after demonetization as the new notes confused several respondents.

Multiple respondents at AKPG reported using social media extensively. They listened to the songs and lectures on YouTube whereas they used Automatic Alternative Text (AAT) protocol for Facebook where they can listen to the description of the images posted on their timeline. At BPA, the respondents mentioned that they used mobile applications of shopping and food delivery portals widely that reduced their dependence on others to get goods they want.

For both BPA and AKPG, active WhatsApp groups for finding writers exist where they connect to other students and can request them to write their exams – something which was the manual process a few years ago.

Speech and hearing impaired – Majority of the respondents used WhatsApp to be in touch with their 'normal' friends. The moderator (one of the teachers) pointed out that the written language for the group differs a bit from the normal ones as the students don't use adjectives or synonyms extensively. For example, the sign of 'heart' signifies a range of emotions – from solidarity to love and friendship. It also gets reflected in their writing, mentioned the moderator while interpreting responses for the question 'What do the students do with mobile phones?'

A feature used by several of the respondents included text-to-speech feature to communicate with their friends and relatives not conversant with sign language.

Orthopaedic impaired – Respondents mentioned that the biggest change mobile phones have brought to them was mobile banking. A respondent at AMM said that due to the online payment system in the majority of the competitive exams, he could apply to several of them. He mentioned that earlier the physical visit to banks was exhausting with his wheelchair and it proved to be a barrier for applications. Another respondent mentioned that a few Ahmedabad-based volunteers are in process of making a map of buildings and outlets which are wheelchair-friendly.

Use of computers: Majority of the male respondents with visual impairment were using JAWS screen reader to access the computer. Out of the female respondents, four mentioned computer access. The respondents mentioned knowledge of computer as a

sure-shot way to get employment in sectors such as BPO, call centre or data entry units where they can excel.

Over 50% of respondents with speech and hearing impairment also wished to pursue a career where they have to work primarily with computers due to 'less human interaction' and text input-based interface.

Sector-specific assistive technology used: Apart from computer and mobile phones, every impairment had specific technology that was used by respondents for better assimilation. For almost all impairments, the respondents mentioned that they had started using assistive devices between 5 and 7 years of age when the disability was not acquired (amputation or ailment at the later stage of life). Affordability was a major factor even after government aid. About 90% were using the middle-range Android handset.

Visually impaired – The respondents reported using the smart cane, a device working on radio frequency attached on the top of their normal cane that can provide vibration alerts or a completely-redesigned cane that can provide both vibration and sound alerts when the person comes in proximity of an object in his/her path along with the direction. About 20% of the respondents reported using or possessing such a cane. When questioned why others don't use it, they mentioned factors such as availability, ease of use and apprehension.

Several respondents mentioned that the cane is good to use in relatively less crowded places. In places like market, the cane vibrates constantly, making the person unsure of where to go. Many participants relied on their 'mental map' of places they daily frequent for navigation.

Speech and hearing impaired – All the 23 participants mentioned receiving digital hearing aid from the school under the government scheme. They mentioned that the use is primarily restricted to homes – in school, everyone understands sign language whereas, on the streets, they hate the high-pitched whistle sound the aid makes. They also mentioned that the amplifier amplifies everything – making sense of what the other

person is saying in a crowded place difficult. Two participants mentioned of searching online for remedies and better equipment.

Orthopedically impaired – At AMM, majority of the male respondents mentioned the use of '*Patla Gadi*,' an invention of their own. Those who must use a wheelchair for mobility sometimes can't manoeuvre small places. Like skateboard, the wooden plank is fixed with wheels so that it can move with the force of hands. They termed it an inexpensive intervention for better mobility. Only three of 20 respondents mentioned the use of a motorized wheelchair. One of the respondents argued that the use of a motorized wheelchair, though a great boon for those with very limited motor movement, also reduces the upper limb exercise. Affordability was a major factor for many respondents who mentioned that the upgrade costs ten times the price of their existing wheelchair.

Consumption and perceived role of mass media: Over 75% of respondents mentioned access to news media through either mobile applications or surfing net on computer. Apart from current affairs – especially for students preparing for competitive exams – they were interested in local news, policy decisions about disability sector and also mentioned getting to know about health camps through advertisements. At both AMM and AKPG respondents mentioned role media can play to improve common perception about PwDs and also to address issues affecting them. For AKPG students, it was the current method of examination where they had to depend on the writers whereas at AMM the respondents wanted media to address accessibility issues.

Perception of assimilation in society, job opportunities and the role of technology: The question of whether they hope to be part of the society and working population seamlessly evoked mixed response from the participants. A high number of participants said that society was sympathetic towards them but felt comfortable more among peers. Those respondents above the age of 25 were more critical of job opportunities, opining that there is a narrow spectrum available for them in terms of employment. At AKPG, some of the students stopped pursuing B.Ed course on the recommendation of their seniors after a change in rule for the government teacher recruitments.

At AMM, a couple of respondents mentioned that due to the impairment, chances of growth at their present job were limited. They mentioned restricted mobility as a major factor responsible. The students were also critical of public transport which did little or nothing for the wheelchair-using population as the majority of them used private transport for movement at a higher cost.

In answer to whether they see the role of assistive and augmentative technology for improvement in the scenario, the respondents below 25 years were more hopeful, mentioning that they can learn new skills through the internet and can work with the 'normal' population – given access to level-playing technology. They cited examples of companies that provide work at home and computer-based employment where mobility is not a prerequisite.

Some of the fields they aspired for included banking and government jobs with quotas, data entry operator or computer-related job work, instructor, music teacher and physiotherapist. The respondents also mentioned that the society also should take steps towards accessibility and inclusivity to create more work opportunities – the majority of the buildings they frequent for education and employment lack properly-designed ramps or elevators that can be accessed by a person on wheelchair.

4. Conclusion

The working population of persons with disabilities (PwDs) in Ahmedabad is using technology extensively in form of mobile phones and assistive devices. It not only helps them communicate with their 'normal' counterparts but also access cyberspace with equal ease on handheld devices. The devices help them get in touch with friends on social media, finding study material for education and employment, and to explore job opportunities.

Use of mobile phones as the assistive device is extremely common among persons with disabilities - as the device served diverse purposes, from internet banking to social media access, and text-to-speech to get in touch with friends and family. Devices such as an infrared technology-based smart cane are not very commonly used by the visually

impaired, whereas digital hearing aid was used by all respondents due to government aid. Over 75% mentioned access to news media through mobile applications or the internet. The respondents also termed the devices important for assimilation in society and getting employment.

While the technology for augmented and assistive devices for different disabilities is getting developed across the globe, awareness, ease of use and affordability are still major factors that hinder the access. Along with assistive devices, PwDs also need matching infrastructure on ground and support of the society to excel and be productive members of the society.

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