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Usability Assessment of Library Services by the People with Disabilities in Digital Environment: Study of NCR, India

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Abstract

The study aims at assessing the usability of library services in the digital environment by the users with disabilities in the libraries of Delhi National Capital Region, India. The survey method is followed for data collection where questionnaire as a data collection tool is used along with personal interviews with the users as well as with the experts and data was analyzed using statistical software ‘Stata version 11’. The results from statistical analysis shows that Internet is the most preferred source among the users with disabilities for the access of required information. Also, there is lack of orientation and training programmes for the users with disabilities in the NCR libraries. The study depicts that ICT has a positive impact in the lives of the people with disabilities. The data analysis reveals that there are inadequate adaptive facilities for the people with disabilities in the NCR libraries to assist them in the access of the required information.

Keywords: People with disabilities, Digital Environment, Library Services, Blind/vision impairment users, Deaf/hearing impairment users, Locomotor impairment users and NCR

1. Introduction

Today libraries all over the world are providing access to essential information to every individual who need to participate in an emerging information society. Therefore, librarians are morally obliged to provide the information to all users irrespective of their status, race, caste gender, age or disability. Although libraries are providing equitable access to information but users with disabilities still lag behind in fully accessing and utilizing the various library services and facilities (Babalola and Haliso, 2011: 141). People with disabilities face several challenges while accessing the

services of various libraries which includes barrier free access to the library building, access to all the library resources, and lack of equipments/technologies to access the information in the desired format. The existing architectural designs of the library buildings restrict the people with disabilities to barrier-free accessible environment. Due to lack of sufficient assistive technologies (i.e. Software/Hardware), users are not able to access the available information resources in the library. Many times, libraries do not realize that people with disabilities want to use their services as they are not prepared to serve them due to lack of suitable Assistive facilities in their libraries (Chaputula and Mapulanga, 2016: 2).

To provide the equitable access to library services for users with disabilities including other marginalized population is an illustration of better management of library services. The libraries in coordination with other similar organizations must take effective measures to eliminate the various obstacles faced by the users with disabilities in the access of information to exaggerate their valuable contribution in the development of harmonious society (Zhao et al., 2019: 46).

Problem Statement

The government of India have framed various policies and enacted laws to ensure the inclusion of people with disabilities in every sphere of the society. The government is providing all the necessary support to the people with disabilities by facilitating their reservations in education sector, employment, various government schemes and programmes etc. (Rayini, 2017: 4). The policy makers of India are well aware of the significance of the existing problems, therefore the government of India have framed various policies and programs for the people with disabilities in India. The National Policy for Persons with Disabilities (2006) in India elaborates that Persons with Disabilities are valuable human resource for our country who seeks to create such environment which provides them equal opportunities along with protection of their rights and facilitating their full participation in the society. Thus, to fulfill the national objective, there is a requirement to conduct more research and analysis in the area of services and facilities available in every sphere of life for the people with disabilities. According to the Census 2011, out of the 121 crore population, there are about 2.68 crore persons with disabilities in India who constitute 2.21 percent of the total population. This

includes persons with visual, hearing, speech, locomotor and mental disabilities. Also, out of the total population of 1,67,87,941 people in NCT of Delhi, the 2,34,882 number of people are suffering from one or the other type of disability (MOSPI, 2017). Individuals with disabilities are part of every demographic group which exist on earth. Thus, irrespective of type or location of the library, the disabled individuals represent an perceptible element of the society served by the library (Chalfen and Farb, 1996: 51). “The accessibility of your library will not be judged by the sophistication of the technologies you have, but by the comprehensiveness of the services you offer” (Cantor, 1996: 45). In this regard, the present study aims at analyzing the usability of library services by the people with disabilities available in the digital environment in National Capital Territory (NCT) of Delhi, India to identify and study the status of the existing adaptive technologies and ICT facilities for the people with disabilities in NCR libraries. In simple words, the present study determines the role of the Internet-based services in the lives of the users with disabilities along with provision and importance of orientation and training programmes. The impact of ICT in the lives of people with disabilities and the status of the available adaptive technologies for the people with disabilities has also been examined. Thus, the following Hypotheses have been framed for the research study:

- 1) Internet serves the best source of information to the People with Disabilities.
- 2) Orientation and Training Programmes for the users lead to the increase in the usage of the Institution/library resources.
- 3) ICT has a positive impact on the level of independence of people with disabilities.
- 4) Adequate Adaptive Technologies exists in the NCR Libraries for the users with disabilities.

2. Scope and Methodology

The survey population of the study includes people with disabilities with main focus on three types of disabilities i.e. blind and vision impairment, deaf and hearing impairment and locomotor impairment as Census 2011 has revealed that these three types of disabilities are majorly found in Indian population (i.e. 20% of disabled persons are suffering from disability in movement, 19% suffering from disability in seeing and other 19% are with disability in hearing). The study covers selected libraries/institutions

located geographically in Delhi NCR only. The people suffering with mental retardation or mental illness are not included in the study.

Due to various limitations of the survey population, the sampling method has not been adopted in the present descriptive survey. The survey method is followed for data collection where questionnaire as a data collection tool is used. The personal assistance was also provided to the users to assist them in completing the survey successfully as they suffered different types of impairment or disability at varying levels. The 'Sign Language Interpreters' also assisted the deaf/hearing impaired users during the survey. During the analysis of survey results, the statistical tests like 'Pearson Chi-square (χ^2) test' and the 'Fisher exact test' were applied to test the proposed research hypotheses with the help of statistical software package 'Stata Version 11' for accurate results to avoid errors. The 15 (i.e. 5 in each category) institutions/libraries are covered in this study which includes the best leading institutions/libraries providing various services to the users with disabilities throughout the Delhi NCR. The selection of the institutions/libraries for each category of users was done on the basis of specialized services offered to the people with disabilities, availability of Assistive technology facilities and well established ICT infrastructure available in the institutions for the users. For the survey of Blind/Vision impaired users, the following libraries/institutions is included in the study:

- i. Amba Dalmia Resource Centre (ADRC), Miranda House ;
- ii. Durgabai Deshmukh College Library (DDCL), Blind Relief Association;
- iii. Braille Library (BL), University of Delhi;
- iv. Hellen Keller Unit (HKU), Jawaharlal Nehru University and
- v. Ram Nath Batra Talking Book Library (RNBTBL), National Association of the Blind (Kumar and Sanaman 2013, p.71).

For the survey of Deaf/hearing impaired users, the following libraries/institutions is included in the study:

- i. All India Federation of the Deaf (AIFD)
- ii. Lady Noyce Secondary School for the Deaf (LNSSD)
- iii. Noida Deaf Society (NDS)
- iv. Daulat Ram Library (DRL), Amar Jyoti Research and Rehabilitation Centre

- v. All India Deaf and Dumb Society (AIDDS).

The libraries/institutions selected for the study of Locomotor impaired users includes:

- i. Central Reference Library (CRL), Jawaharlal Nehru University
- ii. Central Science Library (CSL), University of Delhi
- iii. Daulat Ram Library (DRL), Amar Jyoti Research and Rehabilitation Centre
- iv. Model Integrated Primary School Library (MIPSL), Pt. Deendayal Upadhyaya Institute for the Physically Handicapped
- v. Zakir Husain Library (ZHL), Jamia Millia Islamia (Kumar and Sanaman, 2013: 2-3).

The final data collected from the study was organized in tabular, graphic and textual form for the Descriptive Analysis. The 25 (i.e. =100%) respondents from each library were taken as representative population for the data collection on behalf of each individual library. The survey respondents for the study were selected randomly which included all academicians like Teaching staff, Ph.D. Research scholars, Graduate/Post-graduate students, Secondary/Higher Secondary students) of various Institution/Libraries located in National Capital Territory of Delhi, India.

3. Review of Related Studies

Libraries have to play a vital role in overall development of the society to cater the diverse needs of all categories of people including people with disabilities therefore a flexible approach to service provision is essential. In the global information age, librarians need to work across borders to provide the best possible library services for the specially-abled users to provide an equitable access based on the premise that everyone has the right to information (Griebel, 2003: 156-57). The libraries in today's modern digital age facilitates access to information in variety of formats along with specialized range of services customized to support its users to deal with information independently. The aim of all the libraries should be the provision of equal access of its resources to all the users (including users with any type of disability) irrespective of any boundaries in terms of information (Davies, 2007: 785-86). 'The ALA Council approved the policy of 'Library services for people with disabilities' policy' in 2001, which states that "Libraries play a catalytic role in the lives of people with disabilities by facilitating their full participation in society. Libraries should use strategies based upon the principles of

universal design to ensure that library policy, resources and services meet the needs of all people”.

Todaro (2005) reviews the status of the available library facilities for vision impaired and physically handicapped population in Argentina. The study analyses the information accessibility issues and various assistive technology facilities and requirements for the users with vision impairment. The results revealed that the libraries in Argentina are unable to fulfill the information needs of the vision impaired and physically impaired users and there were many things which needed correction and improvement.

Bac (2005) explored the present status of service provision for the vision impaired users by the Vietnamese public libraries. The practical implementation activities of the libraries are discussed which are provided by the General Sciences Library of Ho Chi Minh City which has played a strong role by providing the various library services to the vision impaired users through support and collaboration with the government of Vietnam and the other philanthropic institutions.

Lee (2007) focused on the importance of raising the awareness about the library services, the information requirements and the rights of users with disabilities among library community, the government and the society. In this regard, National Library of Korea established a National Library Support Center for the Disabled (NLSCD) which utilized various techniques for raising awareness among library professionals by organizing in-house training programmes, workshops/seminars and by organizing promotional events. The support center plays a key role by facilitating the integration of disabled users in the main services and facilities of the library.

The study of Greek libraries conducted by Koulikourdi (2008) elaborates that there is paucity of library services for the users with disabilities. The study identified various barriers faced by disabled users and recommended various methods which may be adopted for the improvement and development of the libraries. Furthermore, the study revealed that there is lack of potential library programmes for the users with disabilities in Greece. It is found that Greek people with disabilities have almost the common requirements as the able-bodied. The Internet and computers plays a central role in the day to day activities of disabled user groups as they offer independence and used for

several purposes like for general reading and study purpose, online shopping, online communication/correspondence via E-mail, etc.

In a particular study of Iran, Bigdeli (2009) studied the role and capabilities of the academic libraries in meeting the information needs of handicapped students with the help of information sources and information services especially designed for handicapped people. It was found that the handicapped students are deprived of services and facilities in Iranian academic libraries and the special services to handicapped students are almost non-existent.

Kwak and Bae (2009) stated that earlier there were poor library facilities for the disabled population in South Korea. But with the advancement in new ICT facilities, the libraries are trying to improve their information accessibility to the vision impaired users. The LG Digital Talking Book Library developed a universal library service for the vision impaired users that can serve the users 24x7 using mobile technology integrated with library automation process. It was found that blind users are unable to receive the latest updates about the current arrivals and there is lack of customized educational content for them, although they were found comfortable in using the mobile phones for handling the information content.

There are various guidelines issued by the UNESCO and IFLA which focus on the equal provision of library services to all user groups including the users with disabilities. The Governments of India and University Grants Commission have also taken various initiatives to serve the people with disabilities (Roy and Bandyopadhyay, 2009: 626). Pinder (2005) surveyed the general academic library response within the UK through a study which gives the valuable overview of the progress made in academic libraries till date on disability issues in the UK and shows that both the legislation combined with the inherent customer service values of the library profession helps to raise the standard of library performance. Beaton (2005) outlines and describes the various challenges faced by the public libraries in offering the services to the users with disabilities in Glasgow, Scotland. The study reveals that despite the range and number of disabled users, it is possible to offer services that comply with legislation and anticipate the needs of disabled users. The recent advances taking place with the improvements in IT-based access technologies for the disabled readers have opened up possibilities for new library

services. Thus, a particular study based on libraries in Scotland provides a descriptive account of past and present professional trends with a particular emphasis on the need to focus on the users rather than the technological aspects related to this area (Joint 2005). Krajina (2007) highlights the innovative role played by the public library of Koprivnica by implementing various new library services for the blind and vision impaired users. The main focus of the library was to cater the information needs of the print disabled children and youth facilitating them with smooth access to the various information resources of their interest.

Chaputula and Mapulanga (2016) investigated the provision of library services for people with disabilities in Malawi. The study further highlighted that there is lack of library and information services for the users with disabilities and addresses the various obstacles faced by them. The lack of assistive equipments to enable the access to library and information resources to the disabled users is also reported in the study. It is found that majority of libraries do not organize any specialized training programmes for the users with disabilities although there are sufficient number of people with disabilities who want to attend the training programmes.

Abdelrahman (2016) elaborated various facilities and information services available at the University of Khartoum in Sudan for the blind and vision impaired users. The study presents the various difficulties faced by these users in the access of the required information. Also, study shows that there is lack of adequate services and facilities for the blind/vision impaired users at the University of Khartoum. The study presents the various recommendations for the improvement of the services for the blind & visually impaired users with special focus on training them on How to use the various assistive technologies available for them in today's digital environment.

Zhao et al. (2019) explores the major reasons in China libraries which give rise to the obstacles in the path of information access by the disabled users. The study focused on the services which may be utilized to remove these obstacles and to facilitate the equal access to the required information by the people with disabilities. The study further provides various suggestions for the collaborative development of the libraries in China and other developing countries. Similarly in the recent study, Addai-Wireko et al. (2020) studied and identified the various barriers faced by the people with disabilities in the

access of information and explored the available assistive devices for them in the academic libraries of Ghana. It is found that there are inadequate adaptive technologies in the libraries selected for the study to support them to work independently in the library. Finally, it is recommended that the role of librarians is important during the designing of library building with all the necessary provisions of adaptive technologies to support the people with disabilities.

The goal of the libraries all over the world should be to identify varied information requirements of the disabled users and provide excellent information services to them as most of the reviewed studies reveal that there are insufficient services and facilities available in libraries to cater the information requirement of the users with disabilities in many countries. Thus, the future libraries have a major role to play where they need to reinvent themselves to make the necessary accommodations for the disabled user community in present competitive environment of the society.

4. Findings and Discussion

In the following statistical analysis, the ‘B, D and L’ abbreviations stand for the Users with Blind/Vision impairment, Users with Deaf/Hearing impairment and Users with Locomotor impairment respectively.

4.1 Preference of Users towards Internet

According to the Chi-square test (χ^2), the First research hypothesis ‘**Internet serves the best source of information to the people with disabilities**’ is statistically accepted. The users with different types of disabilities prefer to use electronic resources like Internet as the best source of information for their personal or academic work. The easy accessibility, availability (24x7) and up-to-datedness of the Internet makes it a popular resource among all the users with or without disabilities.

Table 1: Prefer to use Internet

Users	YES	NO	Total
B	32	59	91
	35.16	64.84	100.00
	34.78	33.15	33.70
D	26	61	87
	29.89	70.11	100.00

	28.26	34.27	32.22
L	34	58	92
	36.96	63.04	100.00
	36.96	32.58	34.07
Total	92	178	270
	34.07	65.93	100.00
	100.00	100.00	100.00

Pearson chi2 (2) = 1.0681 Pr = 0.586

As P value = 0.586 is > 0.05, therefore Hypothesis is Accepted or cannot be rejected.

4.2 Orientation and Training Programmes Attended

The Second research hypothesis ‘Orientation and Training Programmes for the users lead to the Increase in the usage of the institution/library resources’ is statistically rejected through Chi-square (χ^2) tests and Fisher’s exact tests. The results shows that in almost all the libraries, very few users have attended the library orientation programme organized by their library. Also, the majority of users are found unaware of any orientation/training activity organized by the concerned library. Therefore, it is the responsibility of the individual institution/library to inform their users before organizing any library orientation/training activities for all the category of users including people with disabilities. There should be proper intimation/promotional activities/displays etc. through appropriate channels so that more and more users may attend the library orientation and training activities.

Table 2: Attended Orientation Programme

Users	YES	NO	Total
B	6	85	91
D	0	87	87
L	9	83	92
Total	15	255	270
	5.56	94.44	100.00
	100.00	100.00	100.00

Cell frequency is <5

In the Table 2, Chi-square test cannot be performed as there is an assumption that for performing Chi-square test, no cell frequency should be less than 5. Therefore, to

calculate the exact 'p value', the 'Fisher Exact Test' can be performed which is basically done for smaller frequencies (i.e. < 5). The Fisher exact test is usually employed in such research situations where sample size is not only small but also difficult (or impossible) to enlarge within reasonable limits of time or effort (Ghent, 1972: 15).

**CASE 1: Fisher exact test
Attended Orientation Programme**

Users	YES	NO	Total
B	6	85	91
	6.59	93.41	100.00
	100.00	49.42	51.12
D	0	87	87
	0.00	100.00	100.00
	0.00	50.58	48.88
Total	6	172	178
	3.37	96.63	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 5.9364 Pr = 0.015
 Fisher's exact = 0.029
 1-sided Fisher's exact = 0.016

As P value =0.029 is < 0.05, therefore Hypothesis is Rejected or cannot be Accepted in case 1.

**CASE 2: Fisher exact test
Attended Orientation Programme**

Users	YES	NO	Total
B	6	85	91
	6.59	93.41	100.00
	40.00	50.60	49.73
L	9	83	92
	9.78	90.22	100.00
	60.00	49.40	50.27
Total	15	168	183
	8.20	91.80	100.00
	100.00	100.00	100.00

 Pearson chi2(1) = 0.6184 Pr = 0.432
 Fisher's exact = 0.591
 1-sided Fisher's exact = 0.303

As P value =0.591 is > 0.05, therefore Hypothesis is Accepted or cannot be rejected in case 2.

CASE 3: Fisher exact test
 Attended Orientation Programme

Users	YES	NO	Total
D	0	87	87
	0.00	100.00	100.00
	0.00	51.18	48.60
L	9	83	92
	9.78	90.22	100.00
	100.00	48.82	51.40
Total	9	170	179
	5.03	94.97	100.00
	100.00	100.00	100.00

 Pearson chi2(1) = 8.9614 Pr = 0.003
 Fisher's exact = 0.003
 1-sided Fisher's exact = 0.002

As P value =0.003 is < 0.05, therefore Hypothesis is Rejected or cannot be Accepted in case 3.

Table 3: Attended Training Programme

Users	YES	NO	Total
B	32	59	91
	35.16	64.84	100.00
	45.07	29.65	33.70
D	32	55	87
	36.78	63.22	100.00
	45.07	27.64	32.22
L	7	85	92
	7.61	92.39	100.00
	9.86	42.71	34.07
Total	71	199	270

Cell frequency is small

	26.30	73.70	100.00
	100.00	100.00	100.00

Pearson chi2(2) = 25.2052 Pr = 0.000

As P value =0.000 is < 0.05, therefore Hypothesis is Rejected or cannot be Accepted in overall case.

In Table 3, one of the cell frequencies (i.e. 7 for L) is very small as compared to other frequencies. Thus, to calculate the precise probabilities in this situation, the Pearson Chi-square test of 2x2 contingency tables is performed.

**CASE 1: Chi-square test (2x2)
Attended Training Programme**

Users	YES	NO	Total
B	32	59	91
	35.16	64.84	100.00
	50.00	51.75	51.12
D	32	55	87
	36.78	63.22	100.00
	50.00	48.25	48.88
Total	64	114	178
	35.96	64.04	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 0.0505 Pr = 0.822

As P value =0.822 is > 0.05, therefore Hypothesis is Accepted or cannot be rejected in case 1.

**CASE 2: Chi-square test (2x2)
Attended Training Programme**

Users	YES	NO	Total
B	32	59	91
	35.16	64.84	100.00
	82.05	40.97	49.73
L	7	85	92
	7.61	92.39	100.00
	17.95	59.03	50.27
Total	39	144	183
	21.31	78.69	100.00

	100.00	100.00	100.00

	Pearson chi2(1) = 20.7152		Pr = 0.000

As P value =0.000 is < 0.05, therefore Hypothesis is Rejected or cannot be Accepted in case 2.

CASE 3: Chi-square test (2x2)
Attended Training Programme

Users	YES	NO	Total
D	32	55	87
	36.78	63.22	100.00
	82.05	39.29	48.60
L	7	85	92
	7.61	92.39	100.00
	17.95	60.71	51.40
Total	39	140	179
	21.79	78.21	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 22.3320 Pr = 0.000

As P value =0.000 is < 0.05, therefore Hypothesis is Rejected or cannot be Accepted in case 3.

In majority of cases in the above Table 2 and Table 3, the Hypothesis is rejected or cannot be accepted for the users with disabilities. Thus, Hypothesis ‘**Orientation and Training Programmes for the Users lead to the Increased and Effective Use of the Institution/Library Resources**’ is statistically disapproved.

4.3 Role of ICT in Day to Day Activities of People with Disabilities

According to the Chi-square (χ^2) and Fisher’s exact test, the third research hypothesis ‘**ICT has a positive impact on the level of independence of people with disabilities**’ is statistically accepted. The majority of users responded that ICT plays a major role in their lives to deal with day to day challenges and it further help to develop confidence among them which clearly shows that ICT has a positive impact in the lives of the people with disabilities.

Table 4: ICT has a Positive Influence

Users	YES	NO	Total
B	90	1	91
D	81	6	87
L	88	4	92
Total	259	11	270
	95.93	4.07	100.00
	100.00	100.00	100.00

Cell frequency is <5

(Note: Chi-square Test cannot be performed as there is an assumption that for performing Chi-square Test, no cell frequency should be less than 5. Therefore, when cell frequencies are less than 5, the ‘Fisher Exact Test’ of 2x2 contingency tables is performed).

CASE 1: Fisher exact test

ICT has a Positive Influence

Users	YES	NO	Total
B	90	1	91
	98.90	1.10	100.00
	52.63	14.29	51.12
D	81	6	87
	93.10	6.90	100.00
	47.37	85.71	48.88
Total	171	7	178
	96.07	3.93	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 3.9572 Pr = 0.047
 Fisher's exact = 0.060
 1-sided Fisher's exact = 0.052

As P value =0.060 is > 0.05, therefore Hypothesis is Accepted or cannot be rejected in case 1.

CASE 2: Fisher exact test
ICT has a Positive Influence

Users	YES	NO	Total
B	90	1	91
	98.90	1.10	100.00
	50.56	20.00	49.73
L	88	4	92
	95.65	4.35	100.00
	49.44	80.00	50.27
Total	178	5	183
	97.27	2.73	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 1.8171 Pr = 0.178
Fisher's exact = 0.368
1-sided Fisher's exact = 0.187

As P value =0.368 is > 0.05, therefore Hypothesis is Accepted or cannot be rejected in case 2.

Case 3: Fisher exact test
ICT has a Positive Influence

Users	YES	NO	Total
D	81	6	87
	93.10	6.90	100.00
	47.93	60.00	48.60
L	88	4	92
	95.65	4.35	100.00
	52.07	40.00	51.40
Total	169	10	179
	94.41	5.59	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 0.5507 Pr = 0.458
Fisher's exact = 0.527
1-sided Fisher's exact = 0.339

As P value =0.527 is > 0.05, therefore Hypothesis is Accepted or cannot be rejected in case 3.

4.4 User's Satisfaction Level towards Adaptive Facilities in the Libraries

Lastly, the fourth research hypothesis ‘**Adequate Adaptive Technologies exists in the NCR Libraries for the users with disabilities**’ is statistically rejected through Chi-square (χ^2) tests. It is found that in some libraries serving the blind & vision impaired users, there are few assistive software for reading purpose like JAWS, Kurzweil Reader, SAFA and Zoom Text Magnifier/Reader which are not sufficient to meet all the information needs and requirements of the users. It has also been observed that there is lack of sufficient software and hardware facilities for deaf users and locomotor impaired at their respective libraries/institutions.

Table 5: Sufficient Assistive Facilities Available

Users	YES	NO	Total
B	12	68	80
	15.00	85.00	100.00
	26.67	41.21	38.10
D	7	63	70
	10.00	90.00	100.00
	15.56	38.18	33.33
L	26	34	60
	43.33	56.67	100.00
	57.78	20.61	28.57
Total	45	165	210
	21.43	78.57	100.00
	100.00	100.00	100.00

Pearson $\chi^2(2) = 24.4929$ Pr = 0.000

Cell frequency is small

As P value =0.000 is < 0.05, therefore Hypothesis is Rejected or cannot be Accepted.

Again in Table 5, one of the cell frequencies (i.e. 7 for D) is very small as compared to other frequencies. Thus, to calculate the precise probabilities in this situation, the Pearson Chi-square test of 2x2 contingency tables is performed.

CASE 1: Chi-square test (2x2)
Sufficient Assistive Facilities Available

Users	YES	NO	Total
B	12	68	80
	15.00	85.00	100.00
	63.16	51.91	53.33

D	7	63	70
	10.00	90.00	100.00
	36.84	48.09	46.67
Total	19	131	150
	12.67	87.33	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 0.8437 Pr = 0.358

As P value =0.358 is > 0.05, therefore Hypothesis is Accepted or cannot be rejected in case 1.

CASE 2: Chi-square test (2x2)
Sufficient Assistive Facilities Available

Users	YES	NO	Total
B	12	68	80
	15.00	85.00	100.00
	31.58	66.67	57.14
L	26	34	60
	43.33	56.67	100.00
	68.42	33.33	42.86
Total	38	102	140
	27.14	72.86	100.00
	100.00	100.00	100.00

Pearson chi2(1) = 13.9181 Pr = 0.000

As P value =0.000 is < 0.05, therefore Hypothesis is Rejected or cannot be Accepted in case 2.

CASE 3: Chi-square test (2x2)
Sufficient Assistive Facilities Available

Users	YES	NO	Total
D	7	63	70
	10.00	90.00	100.00
	21.21	64.95	53.85
L	26	34	60
	43.33	56.67	100.00
	78.79	35.05	46.15
Total	33	97	130

	25.38	74.62		100.00
	100.00	100.00		100.00

 Pearson chi2(1) = 18.9524 Pr = 0.000

As P value =0.000 is < 0.05, therefore Hypothesis is Rejected or cannot be Accepted in case 3.

(Note: All Calculations done in STATA Version 11)

5. Various Barriers faced by People with disabilities in NCR Libraries

The users with disabilities face several barriers in locating or access of the required information and services at the respective institution/library visited by them. The survey results shows that maximum number of blind/vision impaired users in RNBTBL (68%), ADRC (56%) and DDCL (32%) don't face any barrier in accessing the information, services and collection of their institution/library. In HKU (52%) and BL (44%), maximum users are not able to access or utilize all the facilities and services of the institution/library as there are no individual orientation sessions for the blind/vision impaired users. In HKU 24% users reported various other barriers in the library like there is marking with pen or pencil in some library books which is not identified by the scanners as they are either very old or not in good condition of working. JNU does not have a geographically disabled friendly environment. In DU, there are no special computers for use in the main Central Reference Library for the users.

The survey results shows that maximum number of deaf/hearing impaired users in LNSSD (72%), AIFD (60%) and AIDDS (52%) are not able to access or utilize all the facilities and services of the library as there are no individual orientation sessions for the deaf/hearing impaired users. In NDS, maximum respondents i.e. 56% reported that no announcement with visual indication is the major barrier faced by them. There are no clear large print signages in bold text with good lightening for the hearing impaired in DRL which is found as the major barrier among the majority of respondents (i.e. 36%) in the library. Also, no announcements with visual indication and no clear large print signage in bold text with good lightening are the two common barriers reported in all the libraries by the deaf/hearing impaired users.

Lastly, the data collected from the survey shows that maximum number of locomotor impaired users in CSL (56%), CRL (48%) and DRL (48%) are not able to access or utilize all the facilities and services of the library as there are no individual orientation

sessions for the locomotor impaired users. In ZHL and MIPS L, maximum respondents i.e. 32% and 28% respectively reported that no facility of special adjustments computers for use by locomotor impaired user is the major obstacle faced by them. The lack of assistive technology mouse (ATMouse) designed for the use by people with upper extremity disabilities including persons with difficulties in hand mobility is reported by almost all the users of the concerned libraries under study.

6. Conclusion

The libraries play a very crucial role in the growth and development of the society. The information resources and services offered by them not only create opportunities for learning, support literacy and education rather they help to shape the new ideas and perspectives that are important for creating the innovative society. Thus, libraries should try to serve equally all the segments of the society including the people with disabilities as they are largely benefited with the application of new ICT and assistive technologies of the digital age. The various barriers faced by the people with disabilities in utilizing the maximum benefits of their academic institution/library is a biggest challenge before the authorities which need to be minimized to reduce the gap between the information have and have-nots in the society. The findings indicate that Internet is preferred for locating/access of information by majority of users with disabilities. Thus, it can be concluded that the information seeking behavior of the people with or without disabilities are same. The research analysis shows that there is lack of sufficient assistive technologies for the disabled users in the NCR libraries of India to locate and access the information in the digital information domain. Therefore, libraries need to play a major role in adopting modern and sufficient aids/equipments for the growth and establishment of Hi-Tech libraries which may serve the needs of all category of users including people with disabilities. The provision of orientation/training programmes can enhance the skills of the users to access information which is the most neglected area in the Delhi NCR libraries. Thus, how to meet the information needs of the disabled in the digital environment is an important area to work upon in today's information-based society (Kwak and Bae, 2009) with the sole responsibility (Salinas, 2003) to bring the change in the level of independence of the people with disabilities.

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