Empowering Disables by Assistive Technology: The Role of IGNOU Library

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Abstract

Recent years have witnessed an increase in number of disabled persons entering into the academic institutions including Universities. These special users require special attention because they constitute a large portion of our population who are trying to move into the mainstream of our society. Considering the needs of the disables, the academic libraries need to be equipped with different types of Assistive Technologies (AT), so that this underprivileged community can be empowered to become self reliant. Assistive Technologies used by differently abled people facilitates greater equity in the social, academic and economic public spheres. Author has tried to share some of the key advancements in assistive technologies as well as IGNOU library efforts towards empowering the disabled students to excel in educational environment. Assistive technology is not a need but in current scenario it has become the right for disables.

Keywords: Assistive Technology, Disabled Person, RATE Services, ISLRTC, NCDS

I. Introduction

Indira Gandhi National Open University was established by an Act of Parliament on 20 September, 1985 to democratize higher education by taking education at the door step of learners. It aims at providing cost-effective, quality education to large sections of the population, particularly to the disadvantaged segments of society including those living in remote and far-flung areas, at their door step through various means suited to the Open and Distance Education Mode. IGNOU is the largest university of the world, in terms of enrolment strength and students supports network. The Student Support Services is structured to compensate for the physical separation of students with teachers and offer administrative and academic supports to student in their vicinity. It establishes a link between the students and the University. Managed by the Regional Services Division (RSD) of the university through a countrywide network of Regional Centres, Study Centres (SCs) and Partner Institutions (PIs), it is key to success of delivery of education under the ODL mode. It includes Advicing/counseling, Tutoring individually and in groups, imparting of study and interaction skills, peer group supports, feedback on assessment and studies, language support, career guidance, information service, conduct of term end examinations, administrative problems solving, library, A/V and CD facilities, Remote access to e-resources (RATE), download of IGNOU study materials through e-Gyanskosh, assistive technologies for differently abled people etc.

1.1 IGNOU Library and Documentation Division

The IGNOU Library and Documentation Division started in 1986 with a mission to support the educational and research programmes of the university by providing physical and intellectual access to information. Library operates through a three tier hierarchical system with the Central Library at the Headquarters (New

Delhi) followed by libraries located at Regional Centres (RC) and Study Centres (SC) all over India. As on March 2012, it has 1,28,019 books at Central Library , 2,51,543 books at RC& SC libraries,2318 course materials, 5031 CD ROM, 17,559 Microfiches, 12,588 Bound Journals, 516 subject journals, 56 Magazines, 40 Newspapers, 60 online databases comprises more than 75,000 online journals and more than 2000 e-books with high speed internet download facilities. Its other features includes NODLINET (National Open and Distance Learners' Library and Information Network), RATE service (Remote Access to E-Resources), Discovery Services, Cyber Library, More than 100 PCs for users, Surveillance activities by 40 CCTV Cameras, Powerful Library Management software (Libsys, E-granthalya, KOHA), DSpace (Institutional Repository software) ,Universally available Web OPAC (24x7), Information Literacy Programme and Assistive Technologies for differently abled people.

2. Disability

2.1 What is Disability?

As Per World Health Organization Disability "*is an umbrella term, covering impairments, activity limitations, and participation restrictions. Impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations. Thus disability is a complex phenomenon, reflecting an interaction between features of a person's body and features of the society in which he or she lives.*" [2]

We can simple say that, the physical, mental, intellectual, and psychological conditions of an individual which restrict him for doing different activities of life is termed as disabilities.

According to the Persons with Disabilities Act, 1995, "Person with disability" means a person suffering from not less than forty percent of any disability as certified by a medical authority (any hospital or institution, specified for the purposes of this Act by notification by the appropriate Government).

As per the act, the types of Disabilities includes:

1 Blindness;

2 Low vision;

3 Leprosy-cured;

4 Hearing impairment;

5 Loco motor disability;

6 Mental retardation;

7 Mental illness**.[3]**

The Census of India 2001 defines following five types of disabilities:

1 Seeing,

2 Speech,

3 Hearing,

4 Movement,

5 Mental.

Whereas the third and the latest comprehensive survey on the disabled persons which was carried out in the NSS 58th round (July-December 2002),States five types of disabilities:

1 Mental

2 Visual

3 Hearing

4 Speech and

5 Loco-motor disability.

2.1.1 Disability in India

Estimating reasonably accurate information about the population suffering from physical or mental infirmities is always a challenging task in any society. However since its inception in 1872 Population Census collected data on disability and included questions not only on physically and mentally infirm but also persons affected by leprosy. The National Sample Survey also made its first attempt to collect information on the number of disable persons in its 15th round survey (July 1959-June 1960). As the year 1981 declared as "International Year for the Disabled" it has drawn more attention on disabilities worldwide. The latest informations on disables are based on Population Census 2001 and NSSO survey 58th round on Disability (July – December 2002).

Population Census and NSS surveys are the major two sources of official statistics on disabilities in India but both of them substantially differ especially in respect of overall estimates of persons with disabilities and their age distribution, mainly due to differences in the concepts and definitions and the data collection methodologies. However a *Technical Advisory Committee* (TAC) on Disability Statistics was constituted by the Ministry of Statistics & Programme Implementation in the year 2005 to examine the reasons of variations in the estimates of disability as obtained from NSSO 2002 Survey and Census 2001.It tried to streamline the various definitions used for surveys and Population Censuses of India. It suggested that the Census is being done on a very large scale, it may continue to collect general information about the disabled persons but the definitions may be used as recommended by the Committee. On the other hand, the NSSO

has to collect detailed information about the disabled persons by deep probing. Thus TAC fixed a general criterion for judging a disabled person; this includes:-

1 Disability in Seeing/ Visual Disability
2 Disability in speech/speech disability
3 Disability in hearing/hearing disability
4 Disability in movement/ loco-motor disability
5 Mental disability
6 Leprosy Cured Persons.

The WHO estimates that 10% of the world's population has some form of disability **[4]**

If we look at international scenario we find the prevalence of disability in different countries as below.

Table-1

CENSUSES			SURVEYS		
Country	Year	Percentage of population with disability	Country	Year	Percentage of population with disability
U.S	2000	19.4	New Zealand	1996	20.0
Canada	2001	18.5	Australia	2000	20.0
Brazil	2000	14.5	Uruguay	1992	16.0
U.K	1991	12.2	Spain	1986	15.0
Poland	1988	10.0	Austria	1986	14.4
Ethiopia	1984	3.8	Zambia	2006	13.1
Uganda	2001	3.5	Sweden	1988	12.1
Mali	1987	2.7	Ecuador	2005	12.1
Mexico	2000	2.3	Netherlands	2986	11.6
Botswana	1991	2.2	Nicaragua	2003	10.3
Chile	1992	2.2	Germany	1992	8.4
India	2001	2.1	China	1987	5.0

Source: Mont (2007) **[5]**

In India the official estimates of disabled persons, obtained through the Population Census 2001 and National Sample Survey 2002 put the figure as about 21.9 million (around 2.13 % of the total population) and 18.5 million (1.8 % of total population) respectively.[6][7]

Prevalence of different types of disabilities in India is mentioned below.

Type of Disability	Census of India (2001)	NSSO (2002)
Movement (Locomotor)	28%	51%
Seeing (Visual)	49%	14%
Hearing	6%	15%
Speech	7%	10%
Mental	10%	10%

Table 2: No of Disabled persons and their composition census 2001

Population Category	Total disabled persons (no. in thousand	% of disabled in total population	% distribution of disabled persons by type of disability				
			seeing	speech	hearing	movement	mental
Total	21907	2.13	49	7	6	28	10
Rural	16388	2.21	48	8	6	28	10
Urban	5518	1.93	50	7	4	26	12
Male	12606	2.37	46	8	5	31	11
Female	9301	1.87	53	8	6	24	10
SC	3711	2.23	49	7	6	29	9
ST	1618	1.92	50	8	8	26	8

Source: Population Census (2001). [11]

Regarding prevalence of disability among major states of India, as per 2001 census, percentage of disabled in total population was relatively much higher in J & K (3%), Orissa (2.8%), Kerala (2.7%), Tamil Nadu and H.P. (2.6% each) while it was quite low in Maharashtra (1.6%), Other states includes Rajasthan (2.5%), M.P, W.B. Uttaranchal, Bihar (2.3% each), Haryana (2.2%), U.P, Gujrat (2.2%), Chattisgarh (2%), A.P , K.K (1.8% each) ,Jharkhand, Punjab and Delhi (1.7% each) etc.

2.1.2. No of Disabled Persons and their Composition NSSO survey (2002)

Estimated number of persons suffering from different types of disability (in thousands)

Table 4

Type of Disability	rural	urban	male	female	all persons
mental retardation	700	295	626	369	995
mental illness	840	261	665	437	1101
Blindness	1603	410	929	1085	2013
low vision	655	159	369	444	813
hearing disability	2369	693	1613	1448	3062
speech disability	1603	552	1291	863	2155
locomotor disability	7983	2651	6634	4000	10634
any disability*	14085	4406	10891	7600	18491

Source: NSSO Survey on Disability 2002 [12]

* one or more of mental, visual, hearing, speech and loco-motor disabilities

As regard to the proportion of disabled persons in the population as per NSSO Survey it was found that the percentage was relatively high in H.P (2.6%), Orissa (2.5%), Kerala (2.2%), and Punjab (2%) while it was significantly low in Delhi (0.6%), Assam (1.0%), Jharkhand (1.2%), Rajasthan (1.5%) etc. However, in almost half of the states the prevalence was in the range of 1.6% to 1.8%.

2.1.3 Literacy among Disable persons

In 2001 Population census it was found that majority of disable person were illiterate. Only 58% Disabled Male and 37% of disabled females were reported to be literate in which 3% were graduate and above and another 10% were of secondary or higher Secondary level. There was a Wide gap in literacy rate among disabled existed in the states from 37% in Bihar to 67% in Kerala. As regard to disabled children, 58% of age 6-10 years and 63% of age 11-14 years of age were found to be attending schools, as against 69% and 75% respectively in the general population.

NSSO survey 2002 estimated that about 55% of disable were illiterate, 58% of disabled in the rural and 39% of disabled in urban (age 7 years and above) were not literate, 25% were literate up to primary level, 11% literate up to middle level and rest 9% were of secondary level and above. As regard to states, the highest percentage of illiterates among disabled persons was found in Bihar (66%), Orissa and Andhra Pradesh (64% in each) and the least in Kerala (33%).

3. Constitutional Provisions and various Acts on Disability in India.

In Indian Constitution the Disability issues have been kept under State List and the legislative powers to make rule has been conferred to state.

Article 41 declares that, the State shall, within the limits of its economic capacity and development make effective provision for securing the right to work, to education and to public assistance in cases of unemployment, old age, sickness and disablement.

Article 46 lays down an obligation on the State to promote with special care the educational and economic interests of the weaker sections of the people, and protect them from social injustice and all forms of exploitation.

It's really a matter of concern that the Indian Constitution in Articles 15 and 16 prohibits discrimination in the matter of employment and access to public facilities on grounds of religion, race, caste, sex and place of birth, but it is silent on disability. In fact, the service rules itself until 1995 prevented entry of persons with disabilities in higher grades of service. With the increasing awareness on disability, the formal recognition of discrimination on grounds of disability was felt and several acts were made to protect the rights of the disabled people. i.e. The Mental Health Act, 1987 [13], to consolidate and amend the law relating to the treatment and care of mentally ill persons; The Rehabilitation Council of India Act, 1992,[14] to provide for the constitution of the Rehabilitation Council of India for regulating training of the Rehabilitation Professional and maintaining of a Central Rehabilitation Register and for matters related to these issues. Persons with Disabilities Acts 1995 (Equal Opportunities, Protection of Rights and Full Participation)[15] ; The National Trust for the Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act, 1999 [16], National Policy for Persons with Disabilities Act 2005 [17] (to create an environment that provides them equal opportunities, protection of their rights and full participation in society also aims to ensure better coordination between various wings of the State and Central Governments) etc.

In addition to above legal framework, several institutions have been set up for the welfare of differently abled people. These are:-

- Institute for the Physically Handicapped, New Delhi.
- National Institute of Visually Handicapped, Dehradun
- National Institute for Mentally Handicapped, Secunderabad.
- National Institute for Hearing Handicapped, Mumbai
- National Institute of Rehabilitation Training & Research, Cuttack.
- National Institute for Orthopedically Handicapped, Kolkata
- National Institute for Empowerment of Persons with Multiple Disabilities, Chennai

4. Assistive Technologies

Assistive technology has been used by people with disabilities to enhance function, and as supportive resource tools for community living and participation. In fact, assistive technology includes any item, equipment, or product system, whether acquired commercially, modified or customized, that is used to increase, maintain, or improve functional capabilities of individuals with developmental disabilities. It includes seating and mobility, communication, access, environmental control and daily living technologies. It is imperative to provide assistive technologies so that all disabled persons should have full participation in education, employment, and social life."One of the most important things to remember is that, as humans, we're all temporarily abled. At one point or another it is likely that each of us will use some form of assistive technology"[18]. And that is correct because today we do a lot of work with assistive technologies, paying online bill, online shopping, driving car with GPS, preparing food on Gas stove or in micro oven , using world biggest library www etc.

Assistive technology" encompasses a broad range of assistive devices which can be broadly categorized into "low tech" to "high-tech" tools.

- Low-tech that does not require electricity/Battery, example: pencil grips, highlighters, paper stabilizers etc.
- High-tech refers to state of art technology. Examples: computers, Software, voice synthesizers, Braille readers etc.

Now a days, thousands of assistive technology products are in the market to empower the people with disabilities.

"When many people think of assistive technology, they think primarily about computers or sophisticated electronic devices. However, it is important to realize that assistive technology applications can be viewed as a continuum". [19]

4.1 Computer Assistive Technology

A wide range of computer assistive technology is available to make Person with Disability (PWD) to gain education. iPhone, iPad, iPod, TV ,screen magnifier and *VoiceOver,* a screen-access technology, for the blind and visually impaired, screen reader, *Mouse Keys, Slow Keys,* and *Sticky Keys,* Various software such as JAWS etc are available. PWD can now use computers equipped to follow and interpret commands based on eye movement or breath.

4.1.1 Telecommunication Technology

Telecommunications device for the deaf (TDD) is an electronic method for text communication over a telephone line , primarily designed for persons with hearing or speech difficulties. Example: T*eletypewriter, TTY, textphone,* or *minicom.* Personalized Emergency Response systems (PERS) or Telecare Systems with sensors connected to alarm which help individuals live more independently.

4.1.2 Augmentative Communication Technology

It encompasses various forms of communication used as a supplement to oral language, including voice-output communication devices and computers with synthetic speech. Individuals with limited speech, such as autism, cerebral palsy, and cognitive disabilities can communicate by using synthetic speech (an artificial human speech form) produced by an electronic synthesizer which is activated by a keyboard.

4.1.3 Assistive Technology for Cognition

It is used to augment cognitive processes such as attention, memory, self regulation, navigation, emotion recognition and management, planning etc. For example. *General User Interface for Disorders of Execution* (GUIDE) is an interactive, verbal-prompting system that talks individuals with cognitive disabilities through routine Other examples are visual schedules, calendars and face and voice emotional-recognition software.

4.1.4 Assistive Technologies for Control of the Environment

It allows the disabled to increased control of things in their environment and includes touchpad, remote controls, eye trackers, switches, Braille signs, smoke alarm signals, visible signaling appliances, handrails, and mobility ramps etc. These aids for daily living may also include specially designed bathtubs, shower stalls, and toilet seats, cooking devices, and eating utensils etc.

4.1.5 Assistive Technologies for Visual impairments:

According to the World Health Organization, there are approximately 314 million visually impaired people around the world, a majority of who live in developing countries. [20] AT for Visual impairments includes—Optical Character Recognition (OCR), Braille Translators, Braille Keyboards, Braille embosser/printer, Braille Displays, Speech recognition, Screen Readers, Screen Magnifiers, speech synthesizer, Jaws talking software etc.

5. Assistive Technology Service

Assistive technology service means providing any service that directly assists a Person with Disability(PWD) for performing his required task. The devices must be appropriate for the intended purpose and should not be cumbersome, clumsy or unattractive. It must be capable of being modified or upgraded in future to meet the changing needs.

This service includes:-

- The evaluation of the needs of a person with disability (PWD) in his customary environment;
- Selecting appropriate instrument as needed by PWD.
- Purchasing, leasing, or and acquisition of assistive technology devices.
- Developing, designing, fitting, customizing, adapting, applying, maintaining, repairing, or replacing the devices if needed.
- Training or orientation for professionals, employers, or other individuals who provide services to PWD.
- Training or assisting PWD appropriately for utilizing the services.
- Coordinating with other agencies or institutions associated with existing education and rehabilitation plans and programs for a better understanding.

6. Consideration Process at IGNOU Library for Identifying AT Devices and strategies.

A meeting was held under the chairmanship of University librarian, attended by Director, Project Consultant ISLRTC, Administrator BAASLS, Director NCDS, Dy Director NCIDE, Dy Director Computer Division. Sr. Academic Consultant library division and others to assess the need for acquiring assistive yechnologies for disabled students. Various companies such as M/S Krishna enterprises, Mumbai, Sparsh Products, Jutron Vision etc demonstrated AT products for persons across all disabilities.

The committee:

1. Identified possible need for assistive technology devices and services.
2. Gathered and analyzed baseline information about the students, their requirements and the usability of AT devices.
3. Collected and analyzed information about the specific tasks the student is expected to complete in their environment
4. Identified, selected and listed all assistive technology devices to be procured.
5. Developed a plan for trials of devices and strategies being considered.

6. Created a plan for obtaining devices that are successful.
7. Decided to include persons with expertise in specific areas.
8. Developed a plan for training students, staff, and others for the use of the assistive technology devices.
9. Created implementation, maintenance and repair plan.
10. Decided for routine evaluations for the effectiveness of the assistive technologies and Strategies.
11. And finalised that, the necessary steps will be taken to make changes as necessary time to time to ensure success.

7. Procurement of AT Devices at Library Division

Following devices were recommended for procurement on priority basis.

For Blind

- SARA –CE stand Alone Instant Text Reader (Scan and Read within 5 seconds)
- PEARL Zoom Instant Reader
- Hand Held video Magnifier
- JAWS Talking software (Convert computer into a talking PC)
- Braille Printer (Embosser)
- Talking type tutorial.

For Low vision

- Ony x –For locating books on shelf and reading them from near distance.
- Indigo Video Magnifier—Reading books on screen in large prints.
- Life Style—For reading newspapers/books enlarged.
- Readit Wand—For listening to text if not able to read.
- Pebble—For quickly going through books when not fixedly sitting on table.
- Acrobat—Camera attached to screen used to see from distance and even near.
- Amigo—For seeing enlarge version of Print on screen.
- Senseview Light—For portable quick reading of material when on move.
- ERGO LUX—Hand held Magnifier for quick and easy view.
- Large print Keyboards—For easy typing.
- Voice sense Qwerty—To take note when in meeting.

For Hearing Impaired

- Tobli Communicator software Package from Sveeda.
- Converser Listening service.
- Video Voice for speech therapy and Language development.
- Listener amplification Devices.
- Conversor Pro wireless FM Assistive Listening systems.
- Angel lod cose prtable DAISY, E-book reader.
- Plextalk Pocket PTP1.

For Mental Retardation/Locomotive Disability/Autism

- Flash Card creation software (useful for producing Flash Cards in local language for education and Training.
- Autism Pack (Collection of education/training software that helps to develop speech, vocabulary, listening and communication skills.
- Reactickles software (provides an engaging and accessible computer environment for spontaneous imaginative play and learning.

Some of the above mentioned devices are already installed in Library and Documentation Division, IGNOU such as Braille Printer (Embosser), Scanner, JAWS talking software, Touch screen etc and others are in the process of installation.

8. RATE Services

Remote access to E-Resources (RATE) Service launched by Prof. C.P. Joshi, Minister for Road Transport & Highways, Government of India in July 2011, is a platform through which genuine distance learner of IGNOU can access Approx. 75000 subscribed online journals, more than 1700 subscribed e-books etc. on 24x7 hrs. basis from anywhere.

"Physical libraries in the open and distance system have limited potential to reach out to remote users due to limitations inherent in traditional physical collections. With the introduction of digital media and virtual information systems on the web, IGNOU Library System has since been able to overcome the challenges of accessibility to library resources, reaching out the unreached to support curriculum needs of faculty and distance learners through its network of Regional Centres. [21]

9. Other steps of IGNOU to strengthen Disables

9.1 Indian Sign Language Research & Training Centre (ISLRTC) at IGNOU

ISLRTC was inaugurated on 4th October, 2012 by Hon'ble Kapil Sibal, minister of HRD, and Hon'ble Mukul Wasnik, minister of Social Justice & Empowerment, which is first of its kind that offers full time teaching

combined with distance learning especially for deaf for providing them better education and better employment. The main objective of ISLRTC is to conduct research work in Indian Sign Language (ISL), training interpreters, and preparing teachers to use bilingual approach in teaching Deaf children.

"The main idea is to develop and offer courses aimed at training teachers to teach ISL, develop and create resources for use in teaching of ISL to children, parents, teachers and the general public; facilitate educational use of ISL in special schools as the first language or medium of instruction and in mainstream schools as a second language or as interpreter mediated language of classroom communication." [22]

ISLRTC offers crash courses on Indian Sign Languages, Interpreters training programme, B.A Applied Sign Language Studies (BAASLS) etc. to generate experts with an excellent understandings of the different approaches and methodologies used in language acquisition, language teaching and learning so that the number of sign language teachers, trainers, literacy support teachers and project workers in the specialized area of sign languages and deaf communities can be enhanced.

9.1.1 National Centre For Disability Studies (NCDS)

National Centre for Disability Studies (NCDS) was established in Nov 2006 at IGNOU which acts as a Nodal agency for Open Distance Learning organizations in the country with a mandate to design, develop and implement educational, Vocational and awareness programmes in disability. Its mission is to provide quality education at the doorsteps of the learners, including disabled people and strengthen the potentials of such people and build their capacity which may help them connect to the mainstream in the society. Its main objective is (i) To design, develop and implement the training programmes for all the 16 categories of professionals/personnel recognized by the Rehabilitation Council of India. (ii) To promote and facilitate research on various disability-related issues (iii) To Identify and develop appropriate information and communication technologies and software for education and training in the area of disability and set up a resource centre at IGNOU.

To meet its object NCDS has stated a lot of programmes. e.g. . PG Diploma in Disability Management for Medical Practitioner (PGDMD, B.Ed (Special Education), Foundation Course for In-service Teacher for Teaching Children with Disability, M Ed in Special Education - Visual Impairment (MEDSE VI), M Ed in Special Education - Hearing Impairment (MEDSE HI), Post Graduate Professional Diploma in Special Education - Visual Impairment (PGPDSE VI), . M Ed in Special Education - Visual Impairment (MEDSE HI), Post Graduate Professional Diploma in Special Education - Visual Impairment (PGPDSE VI), Post Graduate Professional Diploma in Special Education - Mental Retardation (PGPDSE MR), Post Graduate Professional Diploma in Special Education - Hearing Impairment, . Post Graduate Professional Certificate in Special Education - Hearing Impairment (PGPCSE HI), B Ed Special Education in Visual Impairment (BEDSEVI), B Ed Special Education in Mental Retardation (BEDSEMR), Certificate in Early Childhood Special Education - mental retardation (CESE(MR)), Post Graduate Diploma in Counseling and Family Therapy (PGDCFT), Master of Science in Counseling and Family Therapy (M.Sc(CFT)), M.Ed in Special Education etc

10. Conclusion

Constitution of India confers education is as one of our fundamental rights. Assistive technologies significantly help disabled students to excel in teaching and learning process. These technologies comprise a number of products which include a wide variety of software, hardware, applications and input devices which allow disabled students to perform difficult tasks independently. It helps individuals in many types of disabilities — from cognitive problems to physical impairment. The major problems in the use of AT are inadequate trained manpower, lack of awareness, infrastructural deficiency and high cost of equipments, but we can get overcome on these shortcoming by creating awareness, willingness, appropriate effort and positive approach. Each of us including Parents, teachers, administrators and PWD and their non-disabled friends have to work together to create such environments in which all students have opportunities to excel in educational life. IGNOU tremendous efforts by providing Open Distance Learning (ODL), online courses, RATE services, establishment of National Centre for disability studies (NCDS), Indian Sign Language Research & Training Centre (ISLRTC) and procuring Assistive Technologies (AT) are noteworthy.

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