Exploring ICT in Empowering Persons with Disabilities in Nepal

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Abstract: According to the World Health Organization (WHO), around 1 billion of the world's population, i.e., around 15% of all people, live with some form of disability. In Nepal, around 2% of the total population has some kind of disability. Most of the disabled population is of a low socioeconomic status. However, the generic studies and surveys that exist are largely varied and are likely to be inaccurate. Person with Disabilities (PwD) face utter challenges and difficulties in areas from their normal livelihood to employment opportunities. Various organizations and activists have been working toward raising the socioeconomic status and quality of life of PwD. With the advent of new technologies, especially in Information and Communications Technology (ICT), that promote accessibility via different assistive devices, the possibility of inclusion of PwD in education and employment has become apparent and many organizations throughout the world have become inclusive. The potential of ICT to transform the lives of PwD should be addressed by the government and other organizations working for the benefit of PwD by formulating and implementing the policies. This paper analyzes various aspects on Disability, Employment, the Role of ICT, and Accessibility to Empower the Life of PwD in Nepal.

Keywords: Persons with Disabilities (PwD), Employment, Information and Communications Technology (ICT), Assistive, Accessibility.

1. Introduction

According to the National Census 2011, 1.94 % of the total population in Nepal has some

form of disability [2]. Figure 1 depicts the rate of disability prevalence in developed countries like New Zealand, the USA, Australia at 24, 20, 18 respectively [11], whereas it's just around 2% in Nepal. However, the National Federation of Disability Nepal (NFDN) claims that around 15% of the total population in Nepal is in some way differently abled in contrast to the 2011 Census of just around 2%. Table 1 shows the differences in the estimates of prevalence.

Table 1: Disability Prevalence

	2001 Census	**2010 NLSS**	**2011 Census**
Total Population	22,736,934		26,494,504
Total disables	103,795		513,301
Disability prevalence rate	0.46	3.6	1.94
Type of disabilities			
1. Physically disabled	39.31	29.2	36.33
2. Visionary problem	15.92	22.3	18.46
3. Hearing	24.61	23.4	15.45
4. Vision and hearing		2.4	1.84
5. Speech related		8.6	11.47
6. Mentally retarded	12.69	6.8	6.03
7. Intellectual disability			2.9
8. Multiple disability	7.48	7.3	7.52
Total	100	100	100

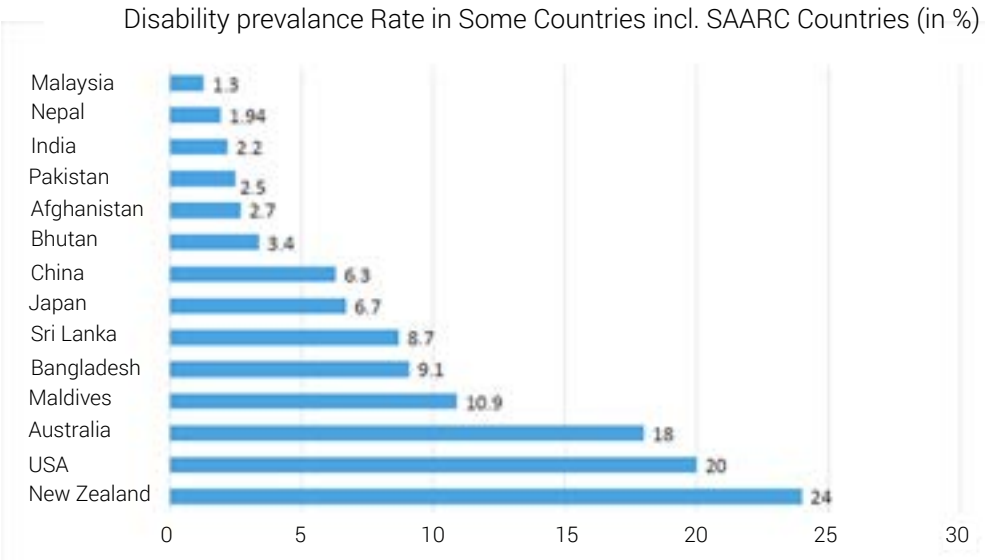

Fig.1: Disability Prevalence in SAARC and a few other countries

2. Major Initiations towards Disability: A Timeline

Figure 2 depicts the timeline of various conventions, rights, and acts towards empowering Persons with Disabilities.

Fig.2: Disability Prevalence in SAARC and few other countries

In addition to these events, in 2013 the broadband commission for digital development, G3ICT, IDA, Microsoft, Telecenter.org and UNESCO have jointly developed a framework called "ICT Opportunity for a Disability-Inclusive Development Framework". [12]

2.1. International Act

The United Nations Convention on the Rights of Persons with Disability (CRPD, 2006) has included the various articles and subjects to empower persons with disabilities which include: Accessibility, Personal mobility, Freedom of expression, Education, Health, Work and mobility [4].

2.2. National Act

The first and foremost legislation regarding the rights of Nepali citizens with disability was the Disabled Protection and Welfare Act (2039 B.S. / 1982 A.D.). The rules, in materializing the act in practice, were however formulated only after 12 years, in 1994. Some legal provisions are shown in Table 3.

3. Employment and unemployment statistics

Nepal's unemployment rate has been hovering around 3% since 2013 [5]. An economically

active population (EAP) is defined by the 2011 census as people of 10 years of age and higher who are active in agricultural activities, wages/salary earnings, non-agricultural business activities, and job-seeking. Most of the employment of the economically active population is based on Agriculture. In Nepal, about 54.20% of the population aged 10 years and above is economically active, and 44.77% is not economically active. There is however unclear what percent of people with disabilities are employed [5]. Countries like China and Sri-Lanka have good employment record of PwDs [6].

4. Survey: Reasons behind unemployment among PwD in Nepal

A survey was conducted among 300 unemployed PwD; Male: 212, Female: 88. All the participants were 15 years of age or older. The question asked was, "What are the main reasons behind your being unemployed?" The graph below depicts the main reasons for their unemployment.

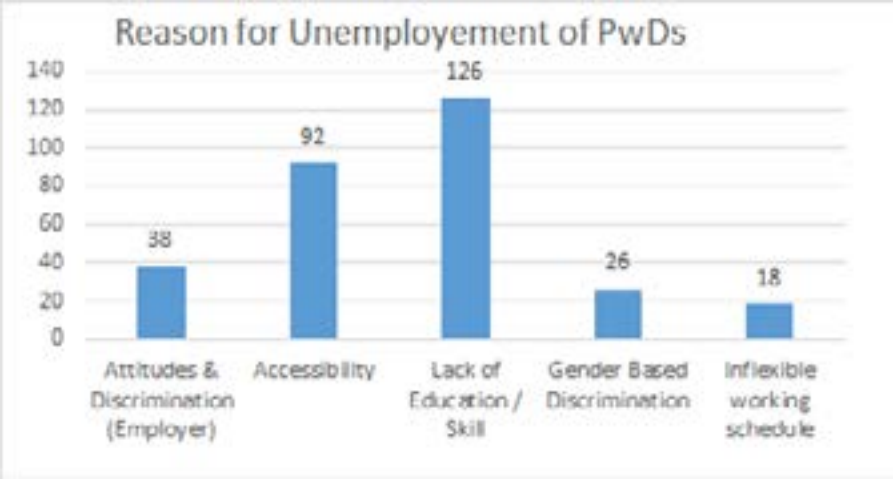

Fig.3: Reason for unemployment of PwDs

5. Survey remarks

This projection shows that Education, Training and Accessibility is the main hurdle for getting an employment opportunity. Apart from that, discrimination has significant impact. Appropriate framework and ICT could play vital role in being inclusive.

6. Initiation towards employment for PWDs in Nepal

The initiative was taken by NFDN/DRPI-AWARE Project [7] which has helped to employ PwD in various sectors to some extend however the number is not so impressive. The Table 2 shows the no of employees in various sector.

Table 2: PwD employed by DRPI-AWARE Project in Nepal

Sector	Employed PwD
Manufacturing Industries, Pharmaceuticals, brush factory	8
Service Industries, Financial, Hospitality, Security, Hospital. Private school	38
NGO/UN trainee-ship	7
IT company	12
Government Agency	1
Total	66

In addition to this, three different career expos (as of 2015) have been organized by the Ministry of Women, Children and Social Welfare, the FNCCI, the National Federation of the Disabled Nepal (NFDN) and the Association of INGOs (AIN) of Nepal. Around 1500 candidates registered for the event and about 12 of them were hired. Some of the examples towards inclusiveness includes organization like Nanglo Bakery Café,Bhatbhateni Supermarket, FNCCI.

7. Survey on IT companies Towards Inclusiveness

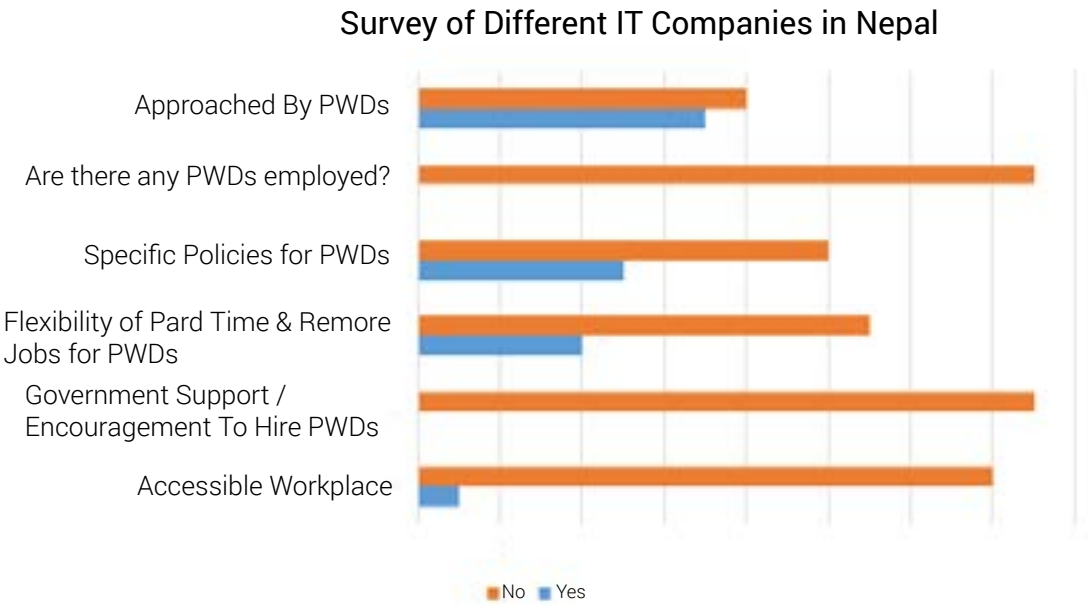

Fig.4: Survey of PwD in IT Companies of Nepal. Total companies: 15

Companies Surveyed, 2017: *Kantipur Digital Corp., Seva Development, Deerwalk Services, Smartmobe Solutions, Bajra Technologies, Pioneer Solutions, Site Hawk, HoneyGuide Apps,*

Bikash Uddhyami, National Incubation and Research Center, Aqore Software Solutions, Mdev Solutions, Softech Foundation, BitsInnovations, RaraTheme.

8. ICT and PwD

The advantages of ICT along with the assistive devices and their usage in the teaching and learning process offer alternative means of communication, access to educational resources in a more convenient way and enhanced learning motivation. The use of assistive technologies in Vision, Communication, Mobility and learning significantly help PwD in many aspects.

8.1. Proposed Model for Empowering PwD

The proposed model is based on the finding that the major reason for unemployment among the PwDs are lack of education and training, i.e., a lack of the basic skill set required for employment opportunities. The other factors include accessibility in terms of assistive technologies as well as ease of access to the physical workplace. This model identifies the various key factors and need for integration of all necessary information to build a required platform for education: Skill enhancing courses and materials, Assistive technologies, Tutors, and Volunteers. Thus the learning management systems proposed would help to empower PwDs. The proposed model should be implemented in two phases. In the first phase, a central database is built which consists of all vital parameters associated with the PwDs as shown in figure five. This helps to keep record and also to process the required information. In the second phase, as shown in figure six, a learning management system is proposed that helps to acquire the knowledge and the skills required to empower PwDs.

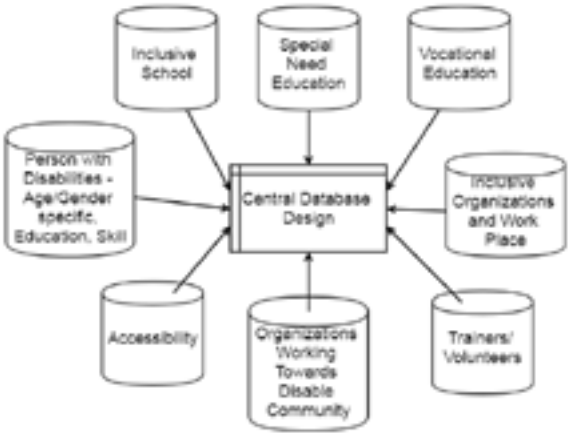

Fig.5: Proposed model of Central Database

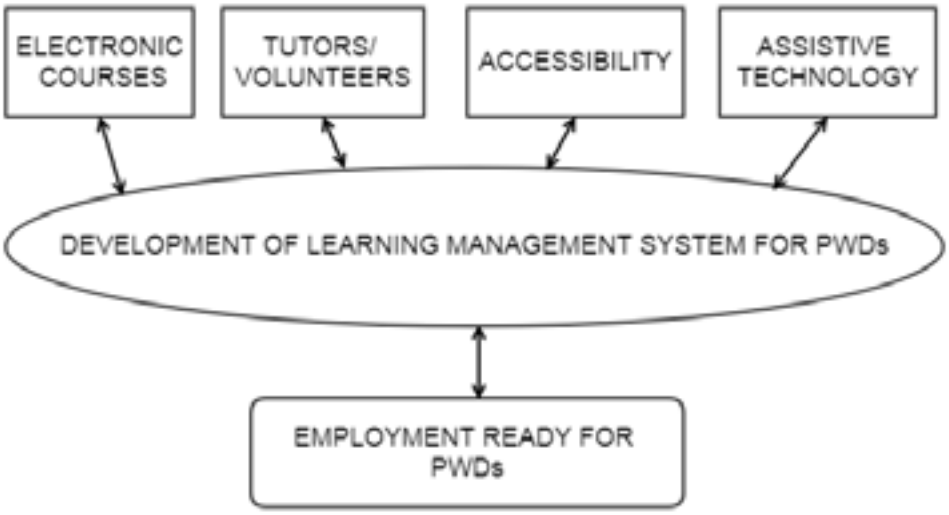

Fig.6: Proposed Model for learning management system

9. Further Recomentations

1. All children with disabilities should be given free education. Assistive technologies such as use of recorders, or screen readers in class rooms should be promoted for an inclusive education.
2. Telecommunication service providers and ICT companies should provide employment opportunities and free Internet service to PWDs as part of their Corporate Social Responsibility (CSR).
3. Each state should have a provision of at least one housing and one rehabilitation center for the PwDs of that region. These centers should be disability friendly and should also contain accessible and assistive technologies.
4. Technology-based training programs to promote employment and self-employment opportunities should be carried out via The Council for Technical Education and Vocational Training (CTEVT).
5. The currency notes issued by Nepal Rastra Bank must be blind friendly and not contain intaglio printing errors.
6. Voice-enabled ATMs should be made available throughout all major cities, if not in all major urban areas.
7. Information about the market of goods produced by PwD-run factories should be internationalized with the help of the Internet.
8. Concrete initiatives should be taken to make public buildings, roads, dormitories,

commercial buildings and other structures--including doors and restrooms--used by the general public disability-friendly, and strong actions should be taken against those in noncompliance.

9. Businesses having more than 25 workers should employee at least 1 PwD. Such businesses that hire people with disabilities should receive a tax incentive or a tax break from the government.
10. Full tax exemption provisions for PwDs along with the introduction of special programs to promote self-employment opportunities.

10. Conclusion:

Poverty and disability are closely interrelated. With the advent of ICT and the usage of assistive devices, society can become inclusive, which is important for uplifting and empowering the condition of PwDs. Appendix D list outs some of the success stories of PwDs in Nepal who have been able to perform various roles in society with the help of ICT. A proper infrastructural and ICT model could most definitely help to empower such people whose empowerment would in turn empower the whole nation. The government must ensure and promote such empowering tools for the benefits of those communities.

11. Acknowledgement:

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12. Appendix

Appendix A: Technology Giants towards Inclusiveness

Appendix B: Several Pilot Projects in some countries to include ICT for PWDs

Appendix C: Various Nature of Jobs offered for PWDs.

Appendix D: List of some success stories among PwDs (in Nepal).

12.1 Appendix A

Company	Accessibility
Apple	Voiceover in Apps, Voiceover Gestures, Voiceover and Text Input, Voiceover and the Rotor, Voiceover Braille Keyboard, Voiceover and Braille Displays, Voiceover and Pronunciation Editor, Display Accommodations, Font Adjustments, Zoom, Audio Descriptions, Magnifier, Speak Screen, Siri, Dictation, Mono Audio, Software TTY, Visible and Vibrating Alerts, FaceTime ,Messages with iMessage, Closed Captions,
Samsung	Color Adjustment, Voice Assistant / Voice Assistant Help, Dark Screen, Rapid Key Input, Voice Label, Font Size, High Contrast Fonts, Magnifier Window, High Contrast Keyboard, Greyscale / Negative Colors, Magnifier
Sony	1. Change the News Suite font size for an easier, Smoother reading experience 2. Electronic Viewfinder / Manual Focus Assist / Peaking Function Assist accurate focusing 3. Change Accessibility settings in one shot for better visibility 4. Audio Description Listen instead of watching 5. TalkBack Spoken feedback for your actions, alerts and notifications 6. SmartEyeglass Developer Edition sound to text right before your eyes 7. Captions Text information for the TV show 8. Voice Search Remote Control LCD TV BRAVIA™ 9. PlayStation®4 Voice Recognition Feature Just say what you want to do
Microsoft	Ease of Access options, Touch keyboard, Using Cortana, Speech Recognition, Touch Mode, Ergonomic keyboards and mice, Eye Tracking, Change the size of text, apps, and other item, Change only the text size, Zoom In and Out of Document, Use the Speak Command for Text-to-speech, Do Things Quickly with Tell Me in Office 201,Get Keyboard Shortcuts and Steps for Using Assistive Technology with Office, Adjust computer volume, Change computer sounds

Company	Accessibility
IBM	Focus, Color, Structure, Navigating information, Clarity, Enlarge fonts, Tab through Interface, Browse Web Page with a screen reader
Google	controlled font size, text magnification, Talkback screen reading software, an in-built screen reader, edit and format documents using voice commands, a caption panel to display braille output, a new set of navigation sounds

12.2 Appendix B

Some countries and their initiatives towards Inclusive Education

Country	Initiatives
Estonia	The Estonian e-Learning Development Centre develops and runs a support system for students with special needs. Some activities include: digitizing and recording teaching materials for students with visual impairments, dedicated training for teachers, assessing physical accessibility of buildings, running scholarship schemes, etc.
Spain	An initiative to create accessible and adapted, personalized course according to the student's need profile. Student has to complete a questionnaire about his/her accessibility and education needs and the course is offered by the University. The project is called European Unified Approach for Assisted Lifelong Learning (EU4ALL). The course is implemented through an eLearning platform: DotLrn.
Uruguay	In order to support better access to education and culture, ever pupil in the public education system is being given a laptop. Since 2008, an initiative began to provide tools to improve accessibility of the laptop for learners with special needs, using assistive technology aids in classes.
Grenada	In 2004, a group of visually impaired students were transferred from a school for blind students to two mainstream secondary schools and provided with assistive technology to aid learning. For example, hardware such as braille printers, specialized keyboards, magnifiers, audio player/recorders and software such as screen readers and text that was prepared in Braille. Five students did very well with four of them attaining a pass rate of 80% and above. The small-scale study in

Country	Initiatives
	Grenada demonstrated the possibilities of using ICT as a tool to support the inclusion for visually impaired students
Germany	In 1986, a project “Informatics for the Blind” was started with a mission to open new study and professional possibilities for visually impaired students by the means of using Information and Communication Technology. It later developed into Study Centre for the Visually Impaired Students (SZS), a separate institute within the Karlsruhe Institute of Technology (KIT) in southern Germany.
United Kingdom	The Home Access Program is a nationwide initiative that aims to provide access to learning at home for all pupils via Internet and also provide assistive technology and specialist software for learners with special need.
Belgium	Bednet is a non-profit organization that supports learners from 6 to 18 years who suffer from long-term and/or chronic illness. Using computers and specially selected peripherals, connected through broadband internet and a dedicated interface, it enables learners (who maybe at home or in a hospital) to take part in classes and their mainstream school activities. It is an example of application of ICT to combat risk of isolation and social exclusion by replacing physical access with virtual access to learning experiences.
Portugal	A national network of 25 ICT resource centers for Special Needs launched by Ministry of Education in the year 2007 recommends assistive technologies for pupils such as tactile screens, hearing-microphone sets, switches, lenses, special keyboards (Intellikeys), Braillers, speech synthesizers etc.
Belarus	The National Institute of Education conducts research into the development of specialist teaching materials. One such project is working to develop software and methodological support in mathematics for students with severe speech disorders, learning difficulties or hearing impairments in special schools.
Russia	Bauman Moscow State Technical University develops and implements special purpose training programs for students with hearing disabilities offered within the mainstream teaching environment. It offers specialist

Country	Initiatives
	Bachelors and Masters programs and ICT is used in various ways viz. as a tool for alternative communication, smart board, etc.
France	A research based ICT tool Handicarte, helps visually impaired students in higher education to 'move' on campus. It does this by calculating the best itinerary from one spot to the other on campus by choosing the easiest, most accessible route.
Slovenia	The open source Learning Management System Moodle is modified to develop a complete e-learning course with the title "How to get a job?". The course makes use of Sign Language Interpreter (SLI) module which enables a multi-modal approach to retrieving information for people are deaf and hard of hearing (sign language interpreter, audio and subtitles).
Austria	Sonderschule Langenstein school uses e-learning as a means to teach pupils with learning disabilities. The school upgrades hardware and software every year to try to provide all the pupils with the best opportunities provided by latest hardware and software.

12.3 Appendix C

Some International companies and the type of jobs they offer for PwD.

Company	Types of Job Provided
IBM	Remote jobs, Full time jobs, Part-time jobs
KPMG	Full time jobs, Part-time jobs, seasonal jobs, Remote jobs
Kaiser Permanente	Full time jobs, Part-time jobs, temporary jobs, freelance jobs
Aetna	Full time jobs, Remote jobs
Ernst & Young	Part-time jobs, flexible schedule jobs, Remote jobs, Freelance jobs
Procter & Gamble	Part-time jobs, Remote jobs
Deloitte	Full time jobs, Remote jobs, Alternative schedule jobs, Freelance jobs
Sodexo	Occasional jobs, Full time jobs, Part-time jobs, temporary jobs, Remote jobs
Starwood Hotels & Resorts	Full time jobs, Part-time jobs, temporary jobs, Remote jobs
Northrop Grumman	Full time jobs, Part-time jobs, occasional jobs, Remote jobs

Company	Types of Job Provided
Lockheed Martin	Full time jobs, Part-time jobs, Remote jobs
Comcast NBC Universal	Part-time jobs, Freelance jobs, temporary jobs, Alternative schedule jobs
Accenture	Freelance jobs, short-term jobs, Full time jobs, Remote jobs
Prudential Financial	Full time jobs, Part-time jobs, temporary jobs, Remote jobs, Freelance jobs
Hartford Financial Services Group	Full time jobs, Remote jobs

12.4 Appendix D

Some success stories of Nepali PwD can be found in reference [10]. Few of them are listed.

S.N	Name	Profession/Achievement	Disability
1	Dr.Kamal Lamichhane	Professor/Advisor	Blind
2	Yubraj Thapa	Homage for disabled people	Physically Challenged
3	Dr. Sweta Singh	Doctor by profession	Blind
4	Ramprasad Dahal	Inventor, Scientist	Blind
5	Laxman BK	Opened school and giving education for free	Physically Challenged
6	Nirmala Gyawali	Braille Library Implementation	Blind
7	Sushil Lamsal	Civil worker at Foreign ministry	Physically Challenged
8	Prabin Shrestha	Director	Physically Challenged
9	Narbahadur saud	Winner of madan puraskar	Physically Challenged
10	Bhojraj Shrestha	School for deaf	Physically Challenged
11	Bhaktiram safal	Successful Shopkeeper	Physically Challenged
12	Aambadutta Joshi	Teacher	Blind
13	Bijay Lamichhane	Civil worker at Pokhara Tax office	Blind
14	Bhadai Tharu	Wilf life activist	Blind
15	Shristi KC	Topper Bachelor	Blind
16	Tripta Thapamagar	Prepared braille books	Physically Challenged
17	Keshavraj Devkota	Teacher, Singer, and Social Worker	Physically Challenged
18	Samala Rai	Singer, Social Worker	Physically Challenged

19	Narbahadur Limbu	Chairperson of Blind Association of Nepal	Blind
20	Jhamak Kumari	Winner of madan puraskar	Hand Osteoarthities
21	Birendraraj Pokhrel	Introduced Daisy Books in Nepal	Blind
22	Pawan Ghimire	Crickter	Blind
23	BishnuRaj Koirala	Engineer	Physically Challenged
24	Govinda Acharya	Doing PHD, Teacher	Blind
25	Sangeeta Pant	Teacher	Physically Challenged

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