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Exploring the ICT Skills Among Persons with Intellectual Disability in Selected Cities of Northen India

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Abstract: Whole world is moving around the Information and Communication Technology (ICT). People with intellectual disability (ID) are not untouched with ICT though they are struggling with cognitive impairment and digital divide. In this context this study was conducted to find out the use of ICT by the person with ID in terms of use of computing devices including smart phone, various apps and soft skills by them. Further, the study explored the relationship between learning of ICT with their learning of functional academic and independent living skills and vice versa.

A sample of 150 individuals with ID from an age group of 14 years and above selected based on stratified random sampling. Out of 150, fifty-eight were screened of having exposure to ICT. Finally, 54 individuals with ID participated in the study. The data was collected through a structured questionnaire for collecting basic information, and ICT skill inventory for assessing ICT skill and selected domains of a standardized adaptive behaviour scale to assess functional academics and independent living skills.

The study revealed that out of total sample of 150, less than 40% with ID exposed to ICT, while half of the participants with intellectual disability are using mobile smartphones irrespective of their severity, gender and age. There was a strong relationship between ICT and independent living as well as functional academic skills irrespective of severity of disability, age and gender. Based on severity of disability, individuals with mild ID did not significantly differ on ICT skill from those have moderate and severe ID. With the increase of severity of disability, ICT skill also diminished. There was a gender bias in ICT skill as females showed poor results

Keywords: Information and Communication Technology (ICT), Persons with Intellectual Disability, Functional Academics, Independent Living Skill.

INTRODUCTION

Information and communication technology (ICT) has been a part of our life; it increases our participation in day-to-day activities (Ramsten et al., 2019). The marginalized groups should have access to ICT too, including the persons with disability in general and intellectual disability (ID) in particular. They not only take great interest in ICT; but also use the internet and ICT (Chadwick et al., 2019). During the pandemic, the technology has changed the life and its' use was appreciated in many folds. The technology not only helps us to get information, but it is the part of our social relationship, recreation, communication and learning. Computers, smart phones with internet facility are the main ICT gadgets which holds great promise for individuals with ID too (Carey et al., 2005). At the beginning of the 21st century, in the developed countries like USA, the access to internet by the people with ID was limited. The National Centre on Educational Statistics (2001) reported that 5 to 17-year-olds without a disability were significantly more likely to use computers and the internet than their peers with disabilities. Furthermore, even among students with disabilities, the students with ID are less likely to have access to and benefit from technology. Over the years with the further development of ICT, youths and adults with intellectual disability have been using the technology in a very big way throughout the world (Ramsten et al., 2020). ICT with the internet at the forefront have the potential to enhance the knowledge, service, employment, development and social interactional opportunities available to people with intellectual disabilities (Chadwick, 2013).

People with more disabilities have far more to gain from the use of ICTs than those who have fewer disabilities (Unwin, 2017). Although the most marginalised groups are the least likely to gain access to ICTs, but that they can make the biggest difference to their lives in terms of enhanced capabilities and functioning (Heeks, 2018). Learning of any skill with the help of ICT, whether it is related to academic or self-care, adults with ID perform well in both typical and

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nontypical learning environments. It provides them equal opportunities and participation in educational and social development (Istenic Starcic and Bagon, 2014); supports in communication, interaction, connection with the learning object, provides reward, motivation and immediate feedback, and finally support the educators (Lewis and Neil, 2001). Further it helps to increase participation in in the educational process (Drigas and Ioanidou, 2013; Alexopoulou, Batsou and Drigas, 2021) including performance-enhancing activities (e.g. Bishop, 2003). Despite that, people with ID may have difficulties in learning the complex skills involved in IT (Li-Tsang et al., 2005) and they are less likely to have access to and benefit from ICT. It has the potential to make learning more experiential (Srivastava, 2019). Therefore, the successful integration of technological tools into learning environments has the potential to benefit all students with special educational needs, especially those with ID. However, there is need for serious efforts to ensure that computers and other technology devices are cognitively accessible.

Participation in the digital world is an important means for taking part in our society, people with ID are still largely excluded from the manifold possibilities of digital participation (Heitplatz et al. 2022). In this context this study aims to find out the status of use of ICT by the person with ID in terms of use of computing devices including smart phone, various apps and soft skills by them. Further, it was aimed to know learning of ICT has any relationship with their learning of functional academic and life skills. The study has been centred around the following research questions: (i) whether adults with ID possess and use ICT based devices as well as related soft skills; (ii) whether there is any relationship between their achievement in academic and life skills with their ICT skills; (iii) whether gender, severity of disability have any influence on their ICT skills.

RESEARCH DESIGN

The study was based on a 'descriptive and quantitative research' method; wherein the survey method was adopted to collect the data on selected variables from the participants. The procedure followed for conducting this study are briefly discussed here.

PARTICIPANTS

The study followed a multi stage sampling method. During the first phase, a total of 150 samples with ID were selected on a random stratified sampling method. The samples were from large to small cities located in north India. They equally represented different severity of disability, gender and age groups as per the Table 1 given here.

Table 1: Selection of Participants of the Study

Variables	Categories	Initial Samples	Samples after Screening of ICT Skills	Final Samples with ICT Skills
Type of Cities	Metro (Delhi NCR)	50	24	24
	Tyre 1 (Lucknow)	50	19	17
	Tyre 2 (Bareilly)	50	15	13
Severity of Disability	Mild ID	50	32	32
	Moderate ID	50	20	18
	Severe ID	50	06	04
Gender	Male	75	42	40
	Female	75	16	14
Age	14-27 Years	75	33	30
	Above 27 Years	75	25	24
Total		150	58	54

The parents of the samples through their teachers including vocational instructors and coaches of Special Olympics were contacted by the researchers to obtain basic information whether the sample has any exposure and/or skills related to ICT. Based on interaction, only 42% (N=63) of the samples were selected those screened of having some ICT skills/exposure. Then after on receipt of consent to participate in the study, a virtual and/or telephonic interview with each participant along with the parents was undertaken to assess their skills related to independent living, functional academic and ICT. Out of 63, five participants with ID did not pass any item from the skill inventory related to ICT. In the final stage a total of 54 participants (Male: 40 and Female 14) were part of the study. Out of 54 participants, 41 had either attended or were

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attending the special school and 13 were from inclusive schools. As per disability certificates officially issued, there were 32 participants with mild, 18 with moderate and only 4 were with severe intellectual disability.

TOOLS AND COLLECTION OF DATA

A structured questionnaire was made by the researchers for collecting personal data of the participants as well assessing their skill profile. This questionnaire was divided into 4 main domains i.e. (i) demographic data, (ii) information about participants with ID, (iii) information related to use of smart phone/ ICT devices by the participants, (iv) information related to their family background. The aforementioned data was collected by both online and offline mode through the questionnaire followed by interview and observation. The questionnaire was made on Google form and sent to their parent's email or WhatsApp. The parents who have limited literacy or ICT skill, they were supplied with the hard copy of questionnaire and their responses were taken by the researchers. The skill profiling was done on the scores obtained by administering the selected domains of a standardized adaptive behavoiur scale i.e. BASIC-MR (Peshwaria and Venketesan, 1992) developed for Indian population. On the basis of their responses, data was compiled and analysis was done.

RESULTS

The study was carried out in three categories of cities of north India having intense penetration of internet services ID across all levels of severity, gender and age were screened those have exposure to ICT. Out of 150 participants, only 58 were found to have ICT related skills. Since there were only 4 participants with severe ID, hence these participants were merged with moderate intellectual disability and the group was renamed as 'Moderate and Severe ID' while obtaining relationship or difference between the groups. The dataset in Table 2 describes the digital literacy among participants with ID.

Table 2: Use of ICT Among Persons with ID

Variable	Categories	N	Have ICT Skill	Percentage
Type of Cities	Metro (Delhi NCR)	50	24	48.00
	Tyre 1 (Lucknow)	50	19	38.00
	Tyre 2 (Bareilly)	50	15	30.00
Severity of Disability	Mild ID	50	32	64.00
	Moderate ID	50	20	40.00
	Severe ID	50	06	12.00
Gender	Male	75	42	56.00
	Female	75	16	21.33
Age	14-27	75	33	44.00
	Above 27	75	25	33.33
Total		150	58	38.66

The ICT skill among adolescents and adults with ID varied across type of cities, severity of disability, gender and age groups. Participants those from metros exhibited better ICT skill whereas this skill was lower with the decrease on the size of cities. With the increase of severity of disability, ICT skill was also skewed downward. There was a gender bias in ICT skill as females showed poor results. The young adults with ID (age group 14-27 years) considered as generation Z influenced by technology and social media; exhibited better ICT skill than their counterparts those are aged above 27 years.

The study also investigated whether persons with intellectual disability have access as well as own digital devices that provide a 24x7 opportunity to use their ICT skill. The participants found to have access to several digital devices such as smart mobile phones, tablets as well as laptops or desktops and in multiple combinations of these devices. Table 3 represents dataset describing the ownership and access to digital devices by the participants with ID.

International Multidisciplinary Research Journal Reviews (IMRJR)
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Table 3: Owning and Accessing Digital Device by Persons with ID

Sl	Types of Devices	Variables		Owns and uses		Uses but does not own		Total Access	
				N	%	N	%	N	%
1	Smart Phone + Laptop/ Desktop	Severity of Disability	Mild	01	3.13	06	18.75	07	21.88
			Mod + Sev	00	00	04	18.18	04	18.18
		Gender	Male	01	2.5	08	20	09	22.25
			Female	00	00	02	14.29	02	14.29
		Age	14-27 Yrs	01	3.33	06	20	07	23.33
			27 Yrs+	00	00	04	16.67	04	16.67
		Total		01	1.85	10	18.52	11	20.37
2	Smart Phone + Tab	Severity of Disability	Mild	01	3.13	04	12.5	05	15.63
			Mod + Sev	01	4.55	02	9.09	03	13.64
		Gender	Male	01	2.5	05	12.5	06	15.00
			Female	01	7.14	01	7.14	02	14.29
		Age	14-27 Yrs	02	6.67	04	13.33	06	20.00
			27 Yrs+	00	00	02	8.33	02	8.33
		Total		02	3.70	06	11.11	08	14.81
3	Smart Phone Only	Severity of Disability	Mild	08	25	11	34.38	19	59.38
			Mod + Sev	04	18.18	07	31.81	11	50.00
		Gender	Male	09	22.5	14	35	23	57.5
			Female	03	21.43	04	28.57	07	50.00
		Age	14-27 Yrs	06	20	09	30	15	50.00
			27 Yrs+	06	25	09	37.5	15	62.50
		Total		12	22.22	18	33.33	30	55.55
4	Non-Smart Phone Only	Severity of Disability	Mild	00	00	01	3.13	01	3.13
			Mod + Sev	01	4.55	03	13.64	04	18.18
		Gender	Male	00	00	02	5.00	02	5.00
			Female	01	7.14	02	14.29	03	21.42
		Age	14-27 Yrs	00	00	02	6.67	02	6.67
			27 Yrs+	01	4.17	02	8.33	03	12.50
		Total		01	1.86	04	7.41	05	9.25
Overall		Severity of Disability	Mild	10	31.25	22	68.75		
			Mod + Sev	06	27.27	15	68.18		
		Gender	Male	10	25	29	72.5		
			Female	06	42.86	09	64.29		
		Age	14-27 Yrs	09	30	21	70		
			27 Yrs+	07	29.17	17	70.83		
		Total		16	29.63	38	70.37		

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Most of the participants have access to smart mobile phones (55.55%) irrespective of severity of disability, gender and age groups. The possession of laptops or desktops (1.85%) and access to these devices (20.37%) were extremely limited among participants with intellectual disabilities. Additionally, approximately 9.25% of the participants did not have access to internet as they own non-smartphone, contributing to the digital divide.

Table 4: Severity of Disability and ICT Skill (Maintenance and Use)

ICT Skills			Mild ID		Moderate ID	
Sl	Areas	Max. Score	Mean	SD	Mean	SD
1	Identification of Parts (Hardware), Apps (Software)	28	18.25	3.97	11.09	3.82
2	Charging & Caring the Device	24	10.44	2.71	6.45	1.41
3	Use of Apps & Software	22	7.0	2.34	3.84	1.44
Overall		74	35.69	8.63	21.36	6.66

Individuals with mild ID perform better compared to those with moderate and severe ID with some variability in performance (as seen by the SDs) such as identifying hardware parts and software apps, charging and caring for the device(s) and using apps and software. Overall, individuals with mild ID score much higher than those with moderate and severe ID. The SD for both groups is relatively large, indicating a range of abilities within each group. The data indicates that individuals with mild ID generally have higher ICT skill than those with moderate ID across all tasks. The standard deviation suggests there is variability in performance within each group, with some individuals performing much better than others.

Table 5 presents data analysing the deviation among Severity, Gender, and Age with ICT skill. The findings suggest that severity, gender, and age do not significantly affect ICT skill in this dataset, as indicated by the non-significant t-values.

Table 5: Deviation among Severity, Gender and Age with ICT Skill

Variables		ICT Skill		t	Level of significance
		Mean	SD		
Level of Severity	Mild	35.69	8.63	1.083	Not significant
	Mod & Severe	21.63	5.82		
Gender	Male	30.4	10.60	0.516	Not significant
	Female	28.29	9.86		
Age in years	14 -27	28.16	10.17	0.21	Not significant
	27 +	31.71	0.39		

Severity of disability, gender and age do not appear to play a major role in ICT skill development. This implies that any differences in ICT skill observed between the groups are likely due to chance rather than underlying factors like severity, gender, or age.

Table 6 explored the relationship between Independent Living and ICT Skill, among participants with intellectual disability by examining their correlation across different variables, such as level of severity, gender, and age.

International Multidisciplinary Research Journal Reviews (IMRJR)
A Peer-reviewed journal
Volume 2, Issue 2, February 2025
DOI 10.17148/IMRJR.2025.020203

Table 6: Relationship between Independent Living and ICT Skill

Variables		Independent Living Skill		ICT Skill		Correlation	Significance
		Mean	SD	Mean	SD		
Level of Severity	Mild	16.53	1.57	35.69	8.63	0.37	p>.01
	Mod & Severe	14.32	2.55	21.36	5.82	0.87	p>.01
Gender	Male	15.3	2.43	30.4	10.63	0.71	p>.01
	Female	5.43	1.87	28.29	9.86	0.53	p>.01
Age in years	14 -27	15.17	2.38	28.37	10.28	0.65	p>.01
	27 Y+	16.21	2.06	31.71	10.39	0.68	p>.01
Total		15.63	2.28	29.85	10.37	0.67	p>.01

For individuals with moderate and severe ID, there is a strong positive relationship between independent living skill and ICT skill; however, there is a weak positive relationship between their independent living skill and ICT skill among participants with mild ID. Irrespective of age and gender of the participants, there is a strong positive correlation between independent living skills and ICT skill. Overall, there is a strong positive relationship between independent living skill and ICT skill across all the groups in the dataset. The overall trend is that independent living skills and ICT skill tend to improve together, with stronger relationships for those with moderate to severe ID, males, and older individuals.

Table 7 examined the relationship between functional academic skills and ICT skill, analysing the correlation across various groups based on level of severity, gender, and age.

Table 7: Relationship between Functional Academic skills and ICT skills

Variables		Functional Academic Skill		ICT Skill		Correlation	Significance
		Mean	SD	Mean	SD		
Level of Severity	Mild	14.88	2.67	35.69	8.63	0.615	p>.01
	Mod & Severe	6.22	2.64	21.36	5.82	0.28	p>.01
Gender	Male	11.08	5.14	30.4	10.60	0.83	p>.01
	Female	12.14	4.82	28.29	9.86	0.64	p>.01
Age in years	14 -21	10.8	5.07	28.37	10.28	0.74	p>.01
	22 +	22.12	4.99	31.71	10.39	0.82	p>.01
Total		11.35	5.03	29.85	10.37	0.78	p>.01

For individuals with mild ID, there is a strong positive relationship between functional academic skill and ICT skills and also same is for individuals with moderate and severe ID, but with a weaker relationship. Irrespective of age and gender of the participants, there is a strong positive correlation between functional academic and ICT skills. Overall, there is a strong positive relationship between functional academic and ICT skills across all groups, with a correlation of 0.78, indicating that, in general, as functional academic improves ICT skill. Across the most groups, there is a strong positive relationship between functional academic and ICT skills, meaning as functional academic improve, so do ICT skill.

DISCUSSION

The present study explored the ICT skill among the individuals with various severity of IDs to understand the usages of ICT skill that facilitate their learning of functional academic as well independent living/life skills and vice versa. ICT and life skills are related with each other and equally important for living in the society (Dimitropoulos et al., 2022). The present study observed that the ICT skill among adolescents and adults with intellectual disability varied across type of cities, severity of disability, gender and age groups. Participants those from metros exhibited better ICT skill and deficit in the skill with the decrease on the size of cities. With the increase of severity of disability, ICT skill also diminished. There was a gender bias in ICT skill as females showed poor results. The technology is a prevalent feature of educational

International Multidisciplinary Research Journal Reviews (IMRJR)
A Peer-reviewed journal
Volume 2, Issue 2, February 2025
DOI 10.17148/IMRJR.2025.020203

environments today; but unfortunately, in too many cases students with intellectual disabilities do not have access to or are not able to use such technologies (Wehmeyer et al., 2004). However, it was found that the young adults with intellectual disability those falling under generation Z category exhibited better ICT skill than their counterparts who are aged above 27 years.

Individuals with disabilities in general and individuals with intellectual disabilities, in particular, are even more disadvantaged and their chances of owning these devices seem almost bleak (Jindal and Sahu, 2022). This study observed that owning various digital devices by the individuals with ID is very limited; less than 2 percent of individuals those use ICT have the possession of laptops or desktops. Persons with disabilities with economical constraints face significant challenges in acquiring digital technology, due to cost and availability (Samant, 2016) and/or may be excluded from such access by undermining their abilities by the family. Therefore, the members of marginalised groups, including those with disabilities, are reported to have unequal access to computers and internet technologies (Guo, Bricout and Huang, 2005; Dunn, 2009; Hasan et al., 2017). According to Thompson (2018), mobile devices are increasingly being used as assistive technology as they are more affordable than specialised systems or devices. Many software applications across different operating systems have been developed to increase the inclusion of people with disabilities (Thompson, 2018). In the current study those have exhibited some skills in ICT, irrespective of severity of disability, gender and age groups, more than half of them have access to smart mobile phones other than various digital devices by the individuals with ID. Patrick et al., (2020) researched a large sample of 370 respondents who have the presence of ID and are older than 18 years and concluded that only 44.6% of people with ID use a mobile phone.

In the present study it was observed that about 10% of the individuals with ID found to have no access to internet since they use non-smart phones only. According to Engwall (2023), Alfredsson and others (2020), there is a significantly higher number of those who do not have access to any technological device that allows access to the internet. However, other studies reported that people with intellectual disability (ID) have been using phones to a greater extent in recent years (Arun and Jain, 2022; Jenaro et al., 2018; Stephenson and Limbrick, 2015). Research in the west shows that over two third of people with ID use a mobile phone every day (e.g. Brunet et al., 2019, Alfredsson et al., 2020; Lough and Fisher, 2016, Lopez-Fernandez et al., 2014). For such marginalized population, mobile devices can improve access to information, promote local knowledge, as well as facilitate sharing and improving social interactions (Barlott, Adams and Cook, 2016).

ICT users with cognitive impairment are likely to make more mistakes and need more time to use web platforms due to their difficulties in orientation (Haesner et al.,2015); hence individuals with mild to moderate cognitive impairment should be offered with simple technologies (Lauriks et al., 2007). The findings of this study indicated that individuals with mild ID generally have higher ICT skills than those with moderate and severe ID across all tasks such as identifying hardware parts and software apps, charging and caring for the devices and using apps and software. With increase of severity of disability, there may be several barriers such as communication difficulties, difficulties remembering tasks/activities, and lack of knowledge and experiences about the current advancement of smart devices and technology. In this study, however, severity of disability, gender and age do not appear to play a major role in ICT skill development. Studies showed that females have limited access and neutral views to ICT than their male counterparts (e.g. Mumporeze and Prieler, 2017, Lee et al., 2019; Tam et al., 2020); however, according to Atika Qazi and others (2021), there is no significant gender differences in use of ICT and skill for learning through technology. Opportunities to have access and use of ICT along with a positive learning environment can facilitate and improve ICT skills among individuals with ID irrespective of severity, age and gender.

As part of life skills, independent living is an important facet of adult life (Stierle, 2022). The ICTs to the improvement of daily living skills of students with intellectual disability is a topic that has been of great concern to scientists in recent years (Alexopoulou, 2021). Assistive technological devices can ensure the likelihood of participation in society, through the compensation of lost functions, increased independence, development potential, enhancing life quality, supplementing education, and obtaining employment (Yeung et al., 2016). Individuals with ID often experience a combination of both intellectual and adaptive functioning deficits which negatively impact their ability to live independently (Stierle, 2022). In this study, the researchers found a common trend was found that independent living and ICT skills tend to improve together, even with stronger relationships for older individuals and also those with moderate to severe IDs.

The use of computer literacy for children with intellectual disabilities is of utmost important and useful skill (Hudson et al., 2005) as they can learn effectively through ICT. According to Carroll (1993), when the person's IQ level decreases or cognitive impairment increases their access to the technology become too limited because of impairment in language and communication skill, cognitive impairment, memory, learning and visual perception related problems, too limited

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knowledge and little achievement. That's why computer based (Vishwakarma and Zarabi, 2023) and video-based (Ledbetter-Cho et al., 2017) instructions enhance student's academic performance. However, in this study, it was observed that across various severity of disability, age groups and gender there is a strong positive relationship between functional academic and ICT skills; meaning as functional academic skill improves, so do ICT skill.

CONCLUSION

Wehmeyer and others (2004) argue that computers are 'cognitively inaccessible' for many individuals with ID and that this may be due to this group of people having rarely been included in decisions relating to computer design. While exploring the ICT skill among persons with ID in selected cities of north India; it is concluded that less than 40% of such persons have access to ICT and mostly through smart phones. There is a strong relationship between ICT and independent living as well as functional academic skills irrespective of severity of disability, age and gender. Based on severity of disability, individuals with mild ID did not significantly differ on ICT skill from those have moderate and severe ID. With the increase of severity of disability, ICT skill also diminished. There was a gender bias in ICT skill as females showed poor results. If people with ID should potentially stand to gain the most from this technology, so the group within society must gain access to and receive the full benefits from the internet. This clearly mirrors the inequalities people with ID face in other spheres within their lives (Chandwik et al., 2013).

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Volume 2, Issue 2, February 2025
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