DEVELOPMENT OF ICF BASED MEASURING TOOL FOR INCLUSIVE EDUCATION SET UPS

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ABSTRACT

Within the framework of International Classifications of Functioning, Disability and Health- ICF, the present study was to develop a functional assessment scale (ICF-FAS) based on the indicators and qualifiers of ICF for children with hearing impairment attending regular schools. The ICF-FAS was developed with 82 items covering all domains of 'Activity' and 'Participation' at second level classification system of ICF. The ICF-FAS was administered on 105 samples of 6-14yrs age selected on stratified random sampling technique representing equally the gender, age group, and various socio-economic background including two third of samples having severe and profound degree of hearing loss. The ICF-FAS was found to be highly sensitive to the changes in the samples' independent variables such as age, gender and degree of hearing loss on their functioning scores in various domains. Out of 82 items of the ICF-FAS, 60 items were found to be in good fit with the measuring system. For ICF-FAS full scale a measure reliability of .72 (Based on Rasch Analysis), a test-retest reliability of 0.71 and an inter-rater reliability of 0.78 were calculated. In comparing the use of teacher's report against parent as proxy to the administration of ICF-FAS, a high degree of correlation was observed in majority of items under domains "Learning and Applying Knowledge', 'Communication' and 'Self-Care'. A moderate to low degree of correlation was found with rest of the domains of the scale.

INTRODUCTION

Over the last half decade, International Classifications of Functioning, Disability and Health-ICF (1) has generated a general consensus as a framework and as a universal measuring system which could be used in addressing a wide-range of programmatic and research

issues related to functioning, disability and access. Bruyere, Van Looy, and Peterson (2) have extensively reviewed the application of ICF and its utility. It was generalised that the ICF is an effective clinical tool with specific disorders, such as chronic health conditions, neuro-musculoskeletal conditions, cognitive disorders, mental disorders, sensory disorders, and primary and secondary conditions in children. Comparing to health sector, less work has been done in applying ICF in the field of disability and rehabilitation. To be specific, it can be stated that the application of ICF is significantly lacking in the field of education and training of individuals with disabilities. Efforts have been taken in the past to understand the use of ICF in education for developing data base, such as Development of an Early Intervention Data Handbook at National Center for Education Statistics/U.S. Department of Education (3). However it did not address program planning or evaluation.

In Indian context, till date no publication has claimed the application of ICF in the country. Therefore, the greatest concern is the promotion of ICF use at country level for the development of national data base. Further, there is need for a single tool across the country (across the globe as well) as an assessment instrument for identification as well as measurement of out come of intervention .The application of the same has an unlimited scope in research. Differences in research tools and their scope will give rise to research findings that have poor generalisation ability on the same target group across the country. Unavailability of suitable tool is significantly realised in the recent years with the drastic increase in the services for the people with disabilities in the country. Besides other existing programmes, Education for All (EFA) has emerged as one of the largest programmes for the children with disabilities in India. This programme is otherwise known as *'Sarva Shikhsa Abhiyan' (SSA)*. SSA has adopted 'Zero Rejection Policy' by ensuring that every child with special need(s), irrespective of the kind, category and degree of disability is provided meaningful and quality education. Planning, implementation and monitoring programme of SSA also demand for a uniform measuring system in India and ICF frame work gives the required global perspective. More than 10 million children with hearing impairment are expected to be part of the regular school by 2010, and then their development with the school is a great concern for professionals.

Over last two years there have been a number of significant efforts to develop tools based on ICF's taxonomy and qualifiers. A large number of tools has been developed by health professionals for example: 'Functional Assessment in Migraine –FAIM' (4); 'Developmentally

Structured Interview for Children with Special Health Care Needs' based on ICF codes (5); 'Health Measurement in Geriatric Care' using ICF codes (6); 'Health Related Quality of Life- HRQOL' based on ICF (7); and 'ICF Core Sets Development for the Acute Hospital and Early Post Acute Rehabilitation Facilities' (8). Recent efforts of Granger (9)"Using Rasch Analysis to Calibrate Measures in the FIM Instrument and the LIFEware SM System" and Bharadwaj (10)"Development of a Fuzzy Likert Scale for the WHO ICF" have been appreciated (11)

Since ICF qualifiers have been adopted to develop scales such as 'Development of Communication Scale for the Elders' (12) , "Mini-ICF-Rating for Mental Disorders (Mini-ICF-P)" (13) and so on, there was strong rationale to develop the ICF-FAS for the children with hearing impairment for developing a data base, intervention, outcome evaluation as well as a standard tool for research in general and specific to SSA.

METHODOLOGY

Several scientific steps were followed to develop ICF based Functional Assessment Scale (ICF-FAS): (a) Adaptation of ICF taxonomy and qualifiers; (a) Construction of items; (b) First round validation of items; (c) Initial try out of the selected items; (d) Final round validation of items; (e) Administration of the tool on standardisation sample; (f) Item analysis; (g) Obtaining reliability of ICF- FAS for standardisation.

The items prepared for the present tool have the ICF original codes for the wider application of the tool. Further, the items were limited to" Activities and Participation" areas of ICF, so that it can be widely used in educational set ups. In order to follow the ICF mainframe, the researcher was bound to develop only one item against each qualifier/indicator at classification of level two. Hence, the chance of increasing or decreasing the number of items or creating a large item tool was restricted. Based on the above criteria and conditions a total of 82 items were developed for ICF based Functional Assessment Scale (ICF-FAS).

The ICF-FAS consisting of 82 items was put into an initial tryout on five individuals with hearing impairment with an age range of 6 to 31 years. There were 3 males and 2 females belonging to different socio-economic status. The feedback obtained from initial tryout in terms of instructions, comprehension of item by the informant of the samples was incorporated

in the development process of the ICF-FAS. The draft ICF-FAS was provided to 18 experts for the final validation on the contents of the scale. Out of 18, only 11 experts responded to the request. Feedback from 11 experts/judges was compiled and the result of feedback was incorporated to ICF-FAS. After incorporating the feedback, the items of the tool was revised and made ready for standardisation.

Table 1. Examples of Few Items from ICF-FAS

ICF Code	Indicators	Test Items
D 140	Learning to Read	Reads his/her address correctly
D166	Reading	Reads news paper or letter or message (Select any one for rating)
D360a	Using Communication Devices	Uses telephone/ Mobile / SMS services/ internet for communicating. (Select any one for rating)
D940	Human Rights	Is aware of various rights/acts- laws e.g. PWD Act 1995/Government schemes

By utilizing the stratified randomized sampling technique 105 children representing equally from each age group, various socio-economic background and degree of hearing loss that included two third of samples having severe and profound degree of hearing loss and rest having moderate or moderate to severe degree of hearing loss. The number of years of schooling (school age) as well as use of hearing aids was recorded. The average school age was found to be 3.77 years and 68% of the sample experienced use of hearing aids since last 1.43 years on the average. The characteristics of standardization samples are given in Table 2.

Table 2. Characteristics of Sample

Sl .	Variable	Category	N	Mean (S.D.)	Percentage
1.	Age	6-10 yrs	54	9.89 yrs (2.56)	51.43%
		11-14 yrs	51		48.57%
2.	Sex	Male	53	—	50.4%
		Female	52	—	49.6%
3.	Socio-economic Status	Low	36	—	34.28%
		Middle	44	—	41.90%
		High	25	—	23.81%
4.	School Age	——-	105	3.77 yrs (2.10)	—-
5.	Hearing Level	40-70 dB	39	—-	37.2%
		71dB+	66	—-	62.8%
6.	Hearing Aid Use	Non-user	34	—-	32%
		User	71	—-	68%
		Length of use		1.43yrs (2.55)	—-

In order to obtain the test-retest and inter-rater reliability; and to compare between parent and teacher for differences in proxy report, different administration methods were adopted. The details about administration of the tool are mentioned in Table 3.

Table 3. Administration of ICF-FAS

Method	Administration One		Administration Two		Purpose
1	1.1	Tool was administered at home with parent as active participant (n = 35)	1.2	Same as 1.1 but after gap of four weeks	Test- Retest Reliability
2	2.1	Same as 1.1 (n = 35)	2.2	Same as 1.1 but by a different rater	Inter- Rater Reliability
3	3.1	Same as 1.1 (n = 35)	3.2	Tool was administ-ered at school with teacher as informant	Validity of Proxy Report

Data was analysed for each item of the ICF-FAS for various domains, though 'Rasch Measurement Model', Test-Retest' and Inter-rater reliability testing were carried out by employing 'Spearman Brown Correlation Technique' and 'Interclass Correlation Coefficient Technique' respectively. Pearson Product Movement Correlation Method was employed to compare the teachers as proxy against the parents contributing as significant informant towards the effective administration of the tool.

RESULTS AND DISCUSSION

The ICF-FAS was found to be highly sensitive to the changes in sample's subjective characteristics. Table-4 indicates the influence of sample's independent variable i.e. age, gender and degree of hearing loss on their functioning scores in various domains of ICF-FAS. Age was found to be the most influencing variable followed by 'degree of hearing loss' and then 'gender'. Communication was observed to be the most affected area irrespective of any group (lower age group vs. higher age group; boys vs. girls). The severely/profoundly hearing impaired samples were found to be more affected (Mean=2.923, SD=1.115) and experience moderate level of difficulty in their functioning. The younger children (6 – 10yrs) scored lower (Mean =1.666, SD=1.497) in 'Learning and Applying Knowledge' than their counterparts. Domains such as 'Domestic life', 'Education, work-employment and economic life' have significant number of items that are only applicable to adult population.

All groups were placed between 'Independent' (4.00) and 'perform with Slight difficulty' (3.0) range of scores in most of the areas and especially in domains of 'Self care', 'Mobility' and 'General task demands'. The earlier observations are indicative of the sensitivity of the scale to changes in the functioning by various groups due to influence of their independent variables. Therefore each domain was observed to be sensitive to any change to the samples because of their subjective variables i.e. age, gender, and degree of hearing loss.

Table 4. Sensitivity of the ICF-FAS to Different Sample Characteristics

Domains	Stat	Age		Sex		Hearing Level	
		6 – 10	11 – 14	M	F	40-70 dB	71 dB+
Learning and Applying knowledge	Mean	1.666	3.333	1.666	2.166	1.666	1.916
	SD	1.497	0.928	1.497	1.527	1.497	1.505
	t	6.692**		1.655 ns		0.833 ns	
General task demands	Mean	3.11	3.83	3.03	2.666	3.01	2.25
	SD	0.688	0.82	0.489	0.577	0.865	0.957
	t	4.756**		3.403**		4.116**	
Communication	Mean	2.02	2.166	2.121	3.004	2.03	1.05
	SD	1.11	1.527	0.08	0.13	0.33	1.414
	t	7.277**		0.547 ns		4.722**	
Mobility	Mean	3.01	3.12	3.32	3.23	3.115	3.12
	SD	0.78	0.861	0.381	0.267	0.777	0.54
	t	0.670 ns		1.368 ns		0.037 ns	
Self – care	Mean	3.083	3.830	3.583	3.181	3.583	2.923
	SD	0.792	0.377	0.792	0.603	0.792	1.115
	t	6.022**		2.856*		3.412**	
Domestic life	Mean	3.75	3.857	3.75	3.743	3.75	3 . 0 0
	SD	0.5	0.377	0.5	0.836	0.5	0 . 8 1 6
	t	1.208 ns		0.051 ns		5.542**	

Interpersonal interactions and Relations	Mean	3.75	3.461	3.75	2.5	3.75	3.00
	SD	0.5	0.518	0.5	0.836	0.5	0.816
	t	2.838*	10.207**	5.542**			
Education work employment and economic life	Mean	2.833	3.473	2.833	2.5	2.833	2.833
	SD	0.983	0.611	0.983	0.707	0.983	0.752
	t	3.910**		1.945 ns		0.001 ns	
Community, social and civic Life	Mean	2.00	3.00	2.00	1.00	2.00	2.00
	SD	0.00	0.00	0.00	1.414	0.00	2.828
	t	NA		NA		NA	

Note: 4.00: Independent, 3.00: Performs with slight difficulty, 2.00: Performs with moderate difficulty, 1.00: performs with extreme difficulty, 0.00 Unable to do.* P < .05 and ** P < .01

In view of having a very specific standardisation sample (i.e. children with hearing impairment of 6 –14 years of age and only those attending schools under SSA), a wide range of responses to all items was restricted. As shown in Table 5, out of 82 items of the ICF-FAS, 60 items were found to be in good fit with the measuring system. Most of the items from 'Mobility', 'Education, Work, Employment and Economic Life' were found misfit. The items found to be misfit were D120, D110, (Learning and Applying Knowledge) D415, D440, D430, D455, D450, D445, D435, D470, D475 (Mobility), D630 (Domestic Life) D770 (Interpersonal Interaction and Relation) D865, D815 and D860, D830, D840, D845, D850, D855, D870 (Education, Work, Employment and Economic life) and D950 (Community, Social and Civic life). The items were misfit due to two reasons:

(i) Indifferent response pattern (when more than 95% of samples responded in a same way to the item);

(ii) Very random response (when items were not applicable to that target group or a few even less than 5% responded to the item).

Indifferent responses to the 'Mobility' and random responses to 'Education, Work, Employment and Economic Life' caused 18 items as misfit out 22 items of the scale. In these misfit items

Rasch analysis indicated a higher outfit/infit ZSTD and/or higher mean square. The analysis also suggested revision for 14 items in order to improve the measure reliability of the scale. Rejection of items of ICF based tool also has been reported earlier. While developing 'Communication Scale for Elders' Okochi, (12) rejected five items from the scale based on Rasch analysis results.

Table 5. Item Analysis

Domains	Total of Items	Good Fit Items	Mis Fit Items	Good Fit Items	Misfit Items & Suggestions	
					Rejection	Revision
Learning & Applying Knowledge	16	10	06	D115, 130, 135, 140, 145, 150,166, 170, 172,177	D110, 120, 160	D 155, 163,175
General Task Demands	04	01	03	D240		D210, 220, 230
Communication	12	07	05	D 315, 325, 330, 340, 345, 360(a,b)		D 310, 320, 335, 350, 355
Mobility	13	07	06	D445,450,455, 460, 470, 475, 480	D410, 415, 420 ,430, 435, 440	
Self-Care	07	06	01	D 510, 520, 530, 550, 560, 570		D540
Domestic Life	06	05	01	D 610, 620, 640, 650 ,660		D630
Interpersonal Interactions	07	07	00	D 710, 720, 730, 740, 750, 760, 770		

Education, Work, Employment…	12	06	06	D 810, 820, 825, 845, 850, 870	D 830, 840, 855,	D815, 860, 865
Community,Social and Civic…	05	03	02	D 910, 920, 940,		D 930, 950

For ICF-FAS, as full scale, a measure reliability of.72 (Based on Rasch Analysis), a test-retest reliability of 0.71 and an inter-rater reliability of 0.78 were calculated. The ICF-FAS was found to have high test-retest correlation confirming its reproducibility for items. However, items under 'Interpersonal Interaction and Relations', 'General Task Demands' and 'Community, Social and Civic Life' demonstrated moderate level of test-retest reliability coefficient. Hence the items need further revision in order to improve their reproducibility. The test-retest reliability could not be measured for most of the items of 'Education, Work, Employment and Economic Life' because of very random responses by the samples.

The ICF-FAS has a high inter-rater agreement for most of the items of the scale except few of the items that have only moderate level of reliability coefficient. Items with moderate or low reliability coefficient need to put into further revision.

Table 6. Reliability and Proxy Validity of ICF-FAS

Domains	Test-Retest Reliability	Inter Rater Reliability	Validity of Proxy Report	Items shown poor reliability/validity
Learning & Applying Knowledge	0.788	0.823	0.803	D130, 155,160, 163
General Task Demands	0.598	0.661	0.466	D220, 240
Communication	0.771	0.832	0.736	D 320, 335, 350, 360b
Mobility 460, 475, 480	0.807	0.833	0.601	D420 ,430, 450, 455,
Self-Care	0.753	0.794	0.712	D530, 540

Domestic Life	0.532	0.679	0.423	D610, 630 , 640, 650, 660
Interpersonal Interactions	0.552	0.728	0.416	D710, 720, 750, 760, 770
Education, Work, Employment…	0.622	0.692	0.691	D 810, 820
Community,Social and Civic…	0.561	0.711	0.641	D 940, 930

The current ICF based tool demonstrated better reliability than its counterparts such as a parallel reliability of .59 was obtained for Mini-ICF-P (Linden and Baron, 2005) and similar result was seen in a ICF based tool developed by Okochi., Utsunomiya, and Takahasti (6). The reliability of 'Activity/Participation' subtest was 0.55 (on Weighted Kappa Statistics).

In comparing the use of teacher's report against parent as proxy to the administration of ICF-FAS, a high degree of correlation was observed in majority of items under domains "Learning and Applying Knowledge', 'Communication' and 'Self-Care'. A moderate to low degree of correlation was found with rest of the domains of the scale. There has been limited generalisation to this finding since the teachers' contact with the sample, student teacher ratio in the class and the training of the teacher in teaching students with disabilities were not taken in consideration while analysing the data.

CONCLUSION

While developing the ICF-FAS, the researchers realised that the tool could have been standardized first on persons with disabilities without narrowing the target population on basis of different disabilities or demographic variables. At the second stage population specific adaptations may be made with reference to any particular disability group and the severity of disability. At the third stage, the same tool could have been validated on a very specific target group in reference to their demographic variables. This would have helped in comparing the specific scores with the main criterion group.

Since the results indicated some items' misfit to the scale as well as some with poor psychometric profile, the ICF-FAS requires revision as per the findings to improve the reliability coefficient of the scale and to economize on time and cost thereon.

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