Functional academics and independent living skills for children with Autism Spectrum Disorder, tool for developing skills among children with Autism Spectrum Disorder

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Abstract:
Autism Spectrum Disorder is an umbrella term and a neuro developmemtal disorder which complicates the social and communication aspects of a child along with repetitive and stereotypical behaviour. Research and experiences have suggested that children on the spectrum can improve if provided with a proper routine, schedule and a structure. Children with Functional academics and independent living skills for children with Autism Spectrum Disorder is a tool developed and used as a curriculum for teaching children with autism spectrum disorder. We have been using functional assessment checklist programming (FACP) and Psycho educational Profile (PEP) for teaching children with Autism Spectrum Disorder. The developed tool will help special educators as a programme for teaching children with Autism Spectrum Disorder. The tool is administered with 10 children having being diagnosed as Autism Spectrum Disorder studying in the NIEPMD model school as a part of pilot testing. Coefficient of reliability was done using Cronbach's alpha, and the variability of the tool was done using factor analysis. The result indicated that the tool Functional Academics and Independent living skills for ASD (FAMILIS) is a reliable and valid tool for evaluation and to develop skills.

Keywords: Autism Spectrum Disorder, Functional academics, Independent living skills.

I. Introduction

RPwD Act 2016 defines Autism spectrum disorder (ASD) as "neuro-developmental condition typically appearing in the first three years of life that significantly affects a person's ability to communicate, understand relationships and relate to others and is frequently associated with unusual or stereotypical rituals or behaviours. Children with autism spectrum Disorder (ASD) are not good with change, they have issues with structure not in place, they have sensory issues, they like routines.

There are have been lot of research going on curriculum and teaching strategies for children with ASD, some are standardized and some are not. A common tool that is being used by many is the psycho education profile (PEP), a tool developed by Eric & Reichler, Robert in the year 1976 at the University of North Carolina. Treatment and Education of Autistic and related Communications Handicapped Children (TEACCH) uses the PEP (Psycho Educational Profile) to identify where the

individual falls behind and also areas where skills are emerging. After assessing the child with ASD on this tool, an educational programme is made for the children with ASD; most of the literature supports PEP.

In our country, though we have been using functional assessment checklist programming (FACP) developed by NIEPID (Formerly NIMH) for Intellectual disability and to some extent ASD also, but there is no specific tool to be used as a curriculum. Similarly Madras Development Programming system (MDPS) designed by Jeyachandran, P and Vimala in the year 1968 provides information related to the functional skills of the individuals with intellectual disability in order to facilitate individualised and group programme. MDPS is also being used as a teaching programme for individual having autism spectrum disorder.

Based on the following tools developed not specifically targeting children with ASD, the tool Functional Academics and Independent living skills for ASD, a criterion referenced assessment tool is prepared which can be used for evaluation and in turn can be used as curriculum for teaching children with ASD, by employing a holistic strategy of teaching.

II. Objective

To find that whether functional academics and independent living skills for children with Autism Spectrum Disorder, tool (FAMILIS) for developing skills among children with Autism Spectrum Disorder is reliable and valid

III. Review of literature

The psycho education profile (PEP) is the most common and widely used assessment tool for programme planning

Bricker D 2002; developed a Multi-domain evaluation named Assessment, Evaluation and Programming System (AEPS) for preschool children with disabilities, aged 3 to 6 years. The test includes simple gross motor tasks expected of children up to age 6 years. It also has Parent questionnaire, which is very helpful in gathering information and selecting relevant goals across environments. It is a curriculum based tool and not standardized

Eric & Reichler, Robert 1976; developed Psycho education Profile (PEP) an individualised psychoeducational assessment for children with Autism Spectrum Disorder, is used for planning individualized education programme for children diagnosed of having Autism aged between 1 to 12 years.

Jeyachandran & Vimala (1968) developed Madras Developmental Programming system (MDPS) for individualised programme plan for persons with intellectual disability. MDPS has undergone several revisions and the latest revision was done in the year 2000.

Karanth, P (2009), developed an early intervention programme for children with developmental disabilities which also includes children with ASD. She also developed a checklist the Commincation Deall Checklist (Com- Deall) to carry out to carry out assessment of children enrolled in the Commication Deall programme, it is a criterion reference and reliable checklist.

Rajaraman, K; Jayaraman, A; Mundkur, N (2018) developed Educating parents on interactive teaching techniques (EDITT) a hands on training programme for parents of children with ASD using social communication play and emotional (SCOPE), a home based parent delivered online intervention. The results indicated improvement.

Rogers and Dawson, 2010; developed Early Start Denver Model Curriculum Checklist for Young Children with Autism (ESDM), aged 7 months to 48 months old. It is a Multi-domain evaluation for preschool children with ASD including 8 domains. The intervention approach was developed. It

includes task analysis and a data collection system, as it is a Criterion referenced tool not standardized

Schopler, Lansing, Reichler & Marcus, 2005; came out with the third edition of PEP-3 and is the, most recent version on the similar lines of the earlier version has utility in clinical, education and research contexts.

Sundberg 2008, came out with Verbal Behavioural Milestones Assessment and Placement Program (VB-MAPP). It consists of 16 areas of skills and can be used with any individual with a language delay. This is specifically designed for younger children with ASD or developmental disabilities. Since it is, a criterion referenced tool and not standardized. The tool is best used with an interdisciplinary team model using a combination of teacher or parent reports and structured observations and testing and useful for tracking progress and for goal setting.

Venkatesan, S 2004, developed and standardised Activity Checklist for Preschool Children with Developmental Disabilities (ACPC-DD). This checklist consisting of 400 items is suitable for infants, toddlers and preschool children between 0 to 72 months and is used as a curriculum guide.

IV. Methodology

Item pooling
The tool Functional Academics and Independent living skills for ASD consist of the following items:
Functional academics (Total 67 items)
1. Reading consisting of 8 items
2. Writing consisting of 7 items
3. Drawing consisting of 8 items
4. Basic computational skills
    i. Problem solving skills consisting of 10 items
    ii. Addition consisting of consisting of 7 items
    iii. Subtraction consisting of 7 items
5. Application of computational skills
    i. Money management skills consisting of 9 items

    ii. Calendar skills consisting of 7 items
    iii. Time skills consisting of 4 items

Independent living skills (Total 66 items)
1. Personal Hygiene
    i. Cleanliness consisting of 8 items
    ii. Hygiene consisting of 8 items
2. Functional communication
    i. Reception consisting of 6 items
    ii. Expression consisting of 6 items
3. House hold
    i. House hold consisting of 7 items
    ii. Shopping consisting of 7 items
4. Interpersonal consisting of 10 items
5. Recreation and leisure
    i. Games/Sports consisting of 7items
    ii. Art/Recreation consisting of 7 items

Scoring:
Physical Prompt (PP)- 0, Gestural Prompt (GP)- 1, Verbal Prompt (VP)-2, Occasional Cues (OC)-3, Independent – 4

Objectively wording the items
The items pooled are written objectively and avoided using ambiguous terms. Since the tool is not to diagnose a child with Autism, certain items where in the diagnostic aspect was getting reflected have been removed.

Establishing validity and reliability
Content validity and face validity was done by sharing the tool to 10 professionals who have the qualification of B. Ed SE (ASD) and M. Ed SE (ASD), based on their suggestion, the items were rewritten and the final items which came out is mentioned in the appendix 1

Pilot testing
A pilot testing was done with the tool and administered to 10 children studying in NIEMD model aged 12 to 16 years and having a diagnosis of Autism Spectrum Disorder. A team of Clinical Psychologist of NIEPMD using standardised

diagnostic tool diagnosed the children having no associated conditions. Final version of the Tool for Functional Academics and Independent living skills for ASD (FAMILIS) is as shown below in the table 1

Table 1 Final version of the tool FAMILIS

Functional Academics

S. N	Items	Scoring				
		P P	G P	V P	O C	Independent
Reading						
1	Reads alphabets from A to Z in English					
2	Recognise sounds of alphabets from A to Z					
3	Reads simple 3 or 4 letter words like (Dog, Cat, Ball, Run etc.)					
4	Reads a simple sentence					
5	Reads a simple paragraph					
6	Listens to a story completely					
7	Glances through the pages of story book					
8	Reads a simple story					
Writing						
	Writing					
1	Scribbles with pen or pencil					
2	Copies alphabets					
3	Writes alphabets					
4	Copies simple words					
5	Writes simple words when told					
6	Write a sentence when told					
7	Writes a paragraph when told					
	Drawing					
1	Drawing lines Horizontally and Vertically					
2	Traces shapes					
3	Join dots to form a shape					
4	Copies shapes					
5	Drawing simple shapes like Cross, Circle, Square and Triangle					
6	Drawing shapes like rectangle, oval, pentagon, hexagon, Octagon					
7	Draws complex shapes like Cube, stars etc.					
8	Draw a boy or girl					

	Basic Computational Skills					
	Problem solving Skills					
1	Grouping of objects like sketch pen, pencil, blocks					
2	Gathering of objects from 1 to 10 (similarly upto 100)					
3	Identifying more or less (quantities)					
4	Counting meaningfully from 1 to 10 (similarly upto 100)					
5	Matching numbers from 1 to 10 (similarly upto 100)					
6	Identifying numbers from 1 to 10 (similarly upto 100)					
7	Naming numbers from 1 to 10 (similarly upto 100)					

S. N	Items	Scoring				
		P P	G P	V P	O C	Independent
8	Tracing the numbers from 1 to 10 (similarly upto 100)					
9	Copying numbers from 1 to 10 (similarly upto 100)					
10	Write numbers when told					
	Addition					
1	Adding horizontally and vertically with pictorial clue objects upto 20					
2	Adding horizontally and vertically with lines upto 20					
3	Adding numbers horizontally and vertically with zero using with pictorial clue					
4	Adding numbers horizontally and vertically with zero using with lines					
5	Adding single digit 3 to 4 line numbers upto 20					
6	Double addition without carry over					
7	Double digit addition with carry over					
	Subtraction					
1	Subtracting horizontally and vertically with pictorial clue objects upto 20					
2	Subtracting horizontally and vertically with lines upto 20					

3	Subtracting numbers horizontally and vertically with zero using with pictorial clue					
4	Subtracting numbers horizontally and vertically with zero using with lines					
5	Subtracting single digit 3 to 4 line numbers upto 20					
6	Addition of word problems upto the number 20					
7	Subtraction of word problems upto the number 20					
Application of computational skills						
	Money management skills					
1	Differentiates Rupees from other objects					
2	Recognises money (Rs.) used for buying things					
3	Identifies rupee notes upto 2000/-					
4	Buys things along with correct change upto Rs.100/-					
5	Reads the MRP of products in a super market					
6	Recognises the capacity of liquids as litre and half litre					
7	Recognises how heavy an object is by weighing (Kgs)					
8	Recognises the length of an object in terms of metres and centimetres					
9	Uses calculator for addition and subtraction					
	Calendar skills					
1	Recognises calendar					
2	Identifies the month, date and year					
3	Names the month, date year					
4	Identifies today, tomorrow, yesterday and next week					
5	Names today, tomorrow, yesterday and next week					
6	Relates time to the daily activities performed					
7	Understands and relates to seasons appropriately					
	Time skills					
1	Recognises clock, watch					
2	Tells time by looking into the clock or watch in hours					
3	Tells time by looking into the clock or watch					

		PP	GP	VP	OC	Independent
	in minutes					
4	Understands the time taken to travel in terms of kilometres					

Scoring: Physical Prompt (PP)- 0, Gestural Prompt (GP)- 1, Verbal Prompt (VP)-2, Occasional Cues (OC)- 3, Independent – 4

Independent Living skills

S. N	Items	Scoring				
		P P	G P	V P	O C	Independent
Personal Hygiene						
	Cleanliness					
1	Brushes teeth twice a day					
2	Rinses mouth to keep bad breath away					
3	Bathes regularly					
4	Washes hair with shampoo at least once in a week					
5	Cleans self after using toilet					
6	Cleans ear with a cotton swab					
7	Uses handkerchief while sneezing/ coughing					
8	Uses nail cutter for trimming nails					
	Hygiene					
9	Eats food without spilling					
10	Washes hands before eating food					
11	Keeps the dish in sink after eating					
12	Wear appropriate shirt/kurta (need not zip or button)					
13	Combs, applies oil to hair and plaits					
14	Applies powder/ bindi					
15	Informs appropriately for menstrual hygiene and shaving					
16	Use public restrooms independently and Appropriately					
Functional Communication						
	Reception					
1	Informs about the basic needs					
2	Responds when calling his name					
3	Understands instruction					
4	Follow written instruction					
5	Stops activities when told to stop					
6	Follows with eyes when individual is moving					
	Expression					
1	Points out preferences, orders and eats in a public dining facility					

2	Ask permission to use the items that belongs to others						
3	Request for help						
4	Convey simple messages						
5	Aware of the functions of various body parts						
6	Differentiates between boy and girl						
House hold							
	House hold						
1	Dusts furniture						
2	Picks up trash from floor and puts in waste basket						
3	Folds clothes and stacks in the cupboard						
4	Keeps the utensils after eating into the sink						
5	Rinses small utensils in water after use						
6	Bolts the door when required						
7	Keeps personal belongings in respective place upon request						
	Shopping						
1	Identifies shops for groceries, vegetable market and super market						
2	Sorts vegetables and keeps them separately						
3	Goes to shop and purchase items written						
4	Walks along road and comes to home carefully from shop						
5	Gives the purchased item to the family members						
6	Serves water/tea/coffee/cool drinks to guests& family members upon request						
7	Helps father/mother while cooking						
	Interpersonal						
1	Keeps personal belongings in respective place upon request						
2	Shares food/toys/materials with peer group						
3	Waits for his/her turn						
4	Understands the facial expression of speaker, if angry/happy/sad						
5	Visits neighbours and relatives along with the other members of the family						
6	Asks/indicates for help when required						
7	Aware of body parts						
8	Maintains distance while interacting with others						
9	Initiates activities with peers and other people						

10	Express gratitude while receiving gifts from others					
Recreation & Leisure						
	Games/Sports					
1	Play with younger kids					
2	Play role play games like teachers, doctors etc.					
3	Plays games by following appropriate rules					
4	Watches videos and video games in gadgets					
5	Initiates visit to beach/park/play ground					
6	Watches TV according to his/her interest by changing channels					
7	Uses community recreational resources					
	Art/Recreation					
1	Shows interest in drawing /painting					
2	Play with pet animals					
3	Engages self in hobbies such as stamp collecting,3D image collecting, coin collecting etc.					
4	Participates in religious activities					
5	Performs art & craft activities such as clay modelling bottle painting etc.					
6	Dances to the favourite tune of film songs					
7	Express going to restaurant/hotels					

Scoring: Physical Prompt (PP)- 0, Gestural Prompt (GP)- 1, Verbal Prompt (VP)-2, Occasional Cues (OC)- 3, Independent – 4

V. Results and Discussions

Tool for Functional Academics Skills

The Functional academics tool KMO value is **0.683** and the significance of Bartlett's test of sphericity was 0.001 and hence the data was found normally distributed and designating that EFA can be applied. Table 2 shows the rotated components matrix. The analysis yielded eight components explaining a total of 79.936 of the variance for the captaincy stress factors. The percentage of variance explained complies with the condition that the cumulative percentage of variance extracted by the factors should be at least 50%.

The first dimension to classify was reading and accounted for 13.811% of variance. Reading dimension contains reads alphabets from A to Z, recognise sounds of alphabets, reads simple 3 or 4 letter words, Reads a simple sentences, reads a simple paragraph, Listens to a story completely, glances through the pages of story book and reads a simple story.

According to the Eigen values, the second dimension is Money management skills having 8.804% of variance. Money management skills dimension has; differentiates rupees from other objects, recognises money (Rs.) used for buying things, identifies rupee notes upto 2000/-, buys things along with correct change upto Rs.100/-, reads the MRP of products in a super market, recognises the capacity of liquids as litre and half

litre, recognises how heavy an object is by weighing (Kgs), recognises the length of an object in terms of metres and centimetres and uses calculator for addition and subtraction.

The third dimension of functional academics skills is writing and it has 7.574% of variance. Writing dimension includes scribbles with pen or pencil, copies alphabets, writes alphabets, copies simple words, writes simple words when told, write a sentence when told and writes a paragraph when told.

Fourth dimension is addition it shows 6.357% of variance. This dimension consists of adding horizontally and vertically with pictorial clue objects upto 20, adding horizontally and vertically with lines upto 20, adding numbers horizontally and vertically with zero with pictorial clue, adding numbers horizontally and vertically with zero with lines, adding single digit 3 to 4 line numbers upto 20, double addition without carry over and double digit addition with carry over.

The fifth dimension is Problem solving Skills and it shows 4.708% of variance. Problem solving Skills contains Grouping of objects, gathering of objects from 1 to 10, identifying more or less (quantities), counting meaningfully from 1 to 10, matching numbers from 1 to 10, identifying numbers from 1 to 10, naming numbers from 1 to 10, tracing the numbers from 1 to 10, copying numbers from 1 to 10 and write numbers when told.

The sixth dimension of functional academic skills is subtraction and has 4.009% of variance. This dimension consist the following questions, these are subtracting horizontally and vertically with pictorial clue objects upto 20, subtracting horizontally and vertically with lines upto 20, subtracting numbers horizontally and vertically with zero using with pictorial clue, subtracting numbers horizontally and vertically with zero using with lines, subtracting single digit 3 to 4 line numbers upto 20, addition of word problems upto the number 20 and subtraction of word problems upto the number 20.

The seventh dimension is Calendar skills and Eigen values shows that this dimension has 3.685% of variance. It consist 7 questions, these are recognises calendar, identifies the month, date and year, names the month, date year, Identifies today, tomorrow, yesterday and next week, names today, tomorrow, yesterday and next week, relates time to the daily activities performed and understands and relates to seasons appropriately.

The eighth dimension of functional academics tool is drawing skills and it shows 2.443% of variance in Eigen value. This dimension contains 9 questions these are Drawing lines, traces shapes, join dots, copies shapes, drawing simple shapes, drawing shapes like rectangle, draws complex shapes like cube and drawing lines horizontally and vertically. One statement "drawing lines horizontally and vertically" has poor loading factor and the question to be removed from the tool.

The last and Ninth dimension is time skills and it shows 2.166% of variance in Eigen value. This dimension contains four questions likely recognises clock, tells time by looking into the clock, tells time in minutes and understands the time taken to travel.

The descriptive statistics of functional academics shows that the reliability of the nine factors as performed through reliability test; and it was considered sufficient as overall functional academics (67 items) is 0.83. However, individually it scores the following reliability values; reading (8 items) 0.78, money management skills (9 items) 0.84, writing (7 items) 0.80, addition (7 items) 0.92, problem solving Skills (10 items) 0.88, subtraction (7 items) 0.80, calendar skills (7 items) 0.86, drawing (8 items) 0.90 and time skills (4 items) 0.77.

Table 2 Analysis 1: Functional Academics Skill

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure	Approx. Chi-Square	p

of Sampling Adequacy.			0.683	4355.127	0.001

Total Variance Explained

Com.	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.811	20.614	20.614	13.811	20.614	20.614	7.206	10.755	10.755
2	8.804	13.140	33.754	8.804	13.140	33.754	6.889	10.282	21.036
3	7.574	11.304	45.059	7.574	11.304	45.059	6.854	10.230	31.266
4	6.357	9.488	54.547	6.357	9.488	54.547	6.489	9.685	40.952
5	4.708	7.027	61.574	4.708	7.027	61.574	6.484	9.677	50.629
6	4.009	5.983	67.557	4.009	5.983	67.557	5.688	8.489	59.118
7	3.685	5.500	73.057	3.685	5.500	73.057	5.000	7.463	66.581
8	2.443	3.646	76.703	2.443	3.646	76.703	4.757	7.100	73.681
9	2.166	3.234	79.936	2.166	3.234	79.936	3.906	5.830	79.512

Extraction Method: Principal Component Analysis.

Rotated Component Matrix (a)

Statements	Component								
	1	2	3	4	5	6	7	8	9
Reads alphabets from A to Z in English	.937								
Recognise sounds of alphabets from A to Z	.929								
Reads simple 3 or 4 letter words like (Dog, Cat, Ball, Run etc.)	.926								
Reads a simple sentence	.911			*Reading*					
Reads a simple paragraph	.877								
Listens to a story completely	.868								
Glances through the pages of story book	.823								
Reads a simple story	.759								
Differentiates Rupees from other objects		.905							
Recognises money (Rs.) used for buying things		.847							
Identifies rupee notes upto 2000/-		.844							
Buys things along with correct change upto Rs.100/-		.831		*Money management skills*					
Reads the MRP of products in a super market		.806							
Recognises the capacity of liquids as litre and half litre		.788							
Recognises how heavy an object is by weighing (Kgs)		.753							
Recognises the length of an object in terms of metres and		.734							

Item	C1	C2	C3	C4	C5	C6	Label
centimetres							
Uses calculator for addition and subtraction	.691						
Scribbles with pen or pencil		.954					
Copies alphabets		.908					
Writes alphabets		.906					*Writing*
Copies simple words		.899					
Writes simple words when told		.898					
Write a sentence when told		.881					
Writes a paragraph when told		.827					
Adding horizontally and vertically with pictorial clue objects upto 20			.951				
Adding horizontally and vertically with lines upto 20			.936				
Adding numbers horizontally and vertically with zero using with pictorial clue			.934				**Addition**
Adding numbers horizontally and vertically with zero using with lines			.933				
Adding single digit 3 to 4 line numbers upto 20			.922				
Double addition without carry over			.886				
Double digit addition with carry over			.550				
Grouping of objects like sketch pen, pencil, blocks				.861			
Gathering of objects from 1 to 10 (similarly upto 100)				.859			
Identifying more or less (quantities)				.853			*Problem solving Skills*
Counting meaningfully from 1 to 10 (similarly upto 100)				.829			
Matching numbers from 1 to 10 (similarly upto 100)				.781			
Identifying numbers from 1 to 10 (similarly upto 100)				.724			
Naming numbers from 1 to 10 (similarly upto 100)				.707			
Tracing the numbers from 1 to 10 (similarly upto 100)				.679			
Copying numbers from 1 to 10 (similarly upto 100)				.670			
Write numbers when told				.633			
Subtracting horizontally and vertically with pictorial clue objects upto 20					.887		
Subtracting horizontally and vertically with lines upto 20					.853		
Subtracting numbers horizontally and vertically with zero using with pictorial clue		**Subtraction**			.846		
Subtracting numbers horizontally and vertically with zero using with lines					.816		
Subtracting single digit 3 to 4 line numbers upto 20					.810		
Addition of word problems upto the number 20					.808		
Subtraction of word problems upto the number 20					.678		
Recognises calendar						.829	
Identifies the month, date and year						.829	
Names the month, date year						.814	
Identifies today, tomorrow, yesterday and next week			**Calendar skills**			.809	

Names today, tomorrow, yesterday and next week								.679	
Relates time to the daily activities performed								.588	
Understands and relates to seasons appropriately								.555	
Drawing lines Horizontally and Vertically									
Traces shapes									.909
Join dots to form a shape									.860
Copies shapes									.814
Drawing simple shapes like Cross, Circle, Square and Triangle				**Drawing**					.793
Drawing shapes like rectangle, oval, pentagon, hexagon, Octagon									.748
Draws complex shapes like Cube, stars etc.									.652
Draw a boy or girl									.620
Drawing lines Horizontally and Vertically									.602
Recognises clock, watch									.917
Tells time by looking into the clock or watch in hours				**Time skills**					.899
Tells time by looking into the clock or watch in minutes									.889
Understands the time taken to travel in terms of kilometres									.772

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Reliability

S.No.	Factors	Item	Reliability
1	Reading	8	0.78
2	Money management skills	9	0.84
3	Writing	7	0.80
4	Addition	7	0.92
5	Problem solving Skills	10	0.88
6	Subtraction	7	0.80
7	Calendar skills	7	0.86
8	Drawing	8	0.90
9	Time skills	4	0.77
Overall Functional Academics		**67**	**0.83**

Tool for Independent Living Skills

Independent Living Skills tool KMO value is **0.835** and the significance of Bartlett's test of sphericity was 0.001 and hence the data was found normally distributed and designating that EFA can be applied. Table 2 shows the rotated components matrix. The analysis yielded eight components explaining a total of 80.902 of the variance for the captaincy stress factors. The percentage of variance explained complies with the condition that the cumulative percentage of variance extracted by the factors should be at least 50%.

First dimension of the independent living skills is cleanliness and its Eigen value is 12.992% of variance. Cleanliness dimension has 8 elements these are brushes teeth twice a day, rinses mouth to keep bad breath away, bathes regularly, washes hair with shampoo at least once in a week, cleans self after using toilet, cleans ear with a cotton swab, uses handkerchief while sneezing/ coughing and uses nail cutter for trimming nails.

Interpersonal skills is the second dimension of independent living skill tool, it has 8.856% of variance in Eigen values. This dimension consist the following questions, these are Keeps personal belongings in respective place upon request, Shares

food/toys/materials with peer group, waits for his/her turn, understands the facial expression of speaker, if angry/happy/sad, visits neighbours and relatives along with the other members of the family, asks/indicates for help when required, aware of body parts, maintains distance while interacting with others, initiates activities with peers and other people and express gratitude while receiving gifts from others.

The third dimension is shopping; it shows that 7.898% of variance in Eigen values. it has seven questions these are Identifies shops for groceries, vegetable market and super market sorts vegetables and keeps them separately, goes to shop and purchase items written, walks along road and comes to home carefully from shop, gives the purchased item to the family members, serves water/tea/coffee/cool drinks to guests& family members upon request and helps father/mother while cooking.

Games/Sports is the fourth dimension; and it has 6.357% of variance in Eigen values. It consist play with younger kids, play role play games like teachers, plays games by following appropriate rules, watches videos and video games in gadgets, initiates visit to beach/park/play ground, watches TV according to his/her interest by changing channels and uses community recreational resources.

The fifth dimension is Reception; reception shows 4.448% of variance in Eigen values. It consist the following questions these are informs about the basic needs, responds when calling his name, understands instruction, follow written instruction, stops activities when told to stop and follows with eyes when individual is moving.

Sixth dimension of Independent living tool is household skills; house hold skills shows 3.960% of variance in Eigen values. Household skills consists the following questions these are dusts furniture, picks up trash from floor and puts in waste basket, folds clothes and stacks in the cupboard, keeps the utensils after eating into the sink, rinses small

utensils in water after use, bolts the door when required and keeps personal belongings in respective place upon request.

Hygiene is the seventh dimension of Independent living tool; this dimension accounted for 3.733% of variance in Eigen values. This dimension contains eats food without spilling, washes hands before eating food, keeps the dish in sink after eating, WEAR appropriate shirt/kurta, applies oil to hair and plaits, applies powder/ bindi, Informs appropriately for menstrual hygiene and shaving, use public restrooms independently and appropriately.

Art/Recreation is the eighth dimension of Independent living tool; this dimension accounted for 3.106% of variance in Eigen values. Art/Recreation has the following question these are shows interest in drawing /painting, play with pet animals, engages self in hobbies such as stamp collecting, 3D image collecting, coin collecting, participates in religious activities, Performs art & craft activities such as clay modelling bottle painting, dances to the favourite tune of film songs and express going to restaurant/hotels.

Expression is the last dimension of the Independent living Scale; this dimension accounted for 2.242% of variance in Eigen values. Expression has the following question these are points out preferences, orders and eats in a public dining facility, ask permission to use the items that belongs to others, request for help, convey simple messages, aware of the functions of various body parts and differentiates between boy and girl.

The descriptive statistics of Independent living skills tool shows that the reliability of the nine factors as performed through reliability test; and it was considered sufficient as overall functional academics (66 items) is 0.85. However, individually it scores the following reliability values; cleanliness (8 items) 0.83, interpersonal (10 items) 0.89, shopping (7 items) 0.84, games/Sports (7 items) 0.77, reception (6 items) 0.81, house hold (7 items)

0.90, hygiene (8 items) 0.85, art/recreation (7 items)   0.80, expression (6 items) 0.91.

Table 3 Analysis 2: Independent Living Skills
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Approx. Chi-Square	P
0.835	30712.351	0.001

Total Variance Explained

Com.	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.992	19.685	19.685	12.992	19.685	19.685	7.190	10.894	10.894
2	8.856	13.418	33.104	8.856	13.418	33.104	6.693	10.141	21.035
3	7.898	11.966	45.070	7.898	11.966	45.070	6.544	9.915	30.950
4	6.160	9.333	54.403	6.160	9.333	54.403	6.507	9.859	40.809
5	4.448	6.740	61.143	4.448	6.740	61.143	5.935	8.993	49.802
6	3.960	6.000	67.143	3.960	6.000	67.143	5.512	8.352	58.154
7	3.733	5.657	72.800	3.733	5.657	72.800	5.479	8.302	66.456
8	3.106	4.706	77.506	3.106	4.706	77.506	5.036	7.631	74.087
9	2.242	3.396	80.902	2.242	3.396	80.902	4.267	6.465	80.552

Extraction Method: Principal Component Analysis.

Rotated Component Matrix

	Component								
	1	2	3	4	5	6	7	8	9
Brushes teeth twice a day	.939								
Rinses mouth to keep bad breath away	.924								
Bathes regularly	.923								
Washes hair with shampoo at least once in a week	.906				**Cleanliness**				
Cleans self after using toilet	.902								
Cleans ear with a cotton swab	.868								
Uses handkerchief while sneezing/ coughing	.815								
Uses nail cutter for trimming nails	.738								
Keeps personal belongings in respective place upon request		.902							
Shares food/toys/materials with peer group		.896							
Waits for his/her turn		.860							
Understands the facial expression of speaker, if angry/happy/sad		.832			*Interpersonal*				
Visits neighbours and relatives along with the		.828							

Item							
other members of the family							
Asks/indicates for help when required	.726						
Aware of body parts	.715						
Maintains distance while interacting with others	.700						
Initiates activities with peers and other people	.655						
Express gratitude while receiving gifts from others	.626						
Identifies shops for groceries, vegetable market and super market		.944					
Sorts vegetables and keeps them separately		.939					
Goes to shop and purchase items written		.938	**Shopping**				
Walks along road and comes to home carefully from shop		.932					
Gives the purchased item to the family members		.926					
Serves water/tea/coffee/cool drinks to guests& family members upon request		.857					
Helps father/mother while cooking		.543					
Play with younger kids			.943				
Play role play games like teachers, doctors etc.			.910				
Plays games by following appropriate rules			.905				
Watches videos and video games in gadgets			.887	**Games/Sports**			
Initiates visit to beach/park/play ground			.886				
Watches TV according to his/her interest by changing channels			.875				
Uses community recreational resources			.817				
Informs about the basic needs				.953			
Responds when calling his name				.952			
Understands instruction		**Reception**		.939			
Follow written instruction				.926			
Stops activities when told to stop				.885			
Follows with eyes when individual is moving				.736			
Dusts furniture					.868		
Picks up trash from floor and puts in waste basket					.842		
Folds clothes and stacks in the cupboard					.839		
Keeps the utensils after eating into the sink			*House hold*		.816		
Rinses small utensils in water after use					.805		
Bolts the door when required					.783		
Keeps personal belongings in respective place upon request					.655		
Eats food without spilling						.837	
Washes hands before eating food						.832	
Keeps the dish in sink after eating						.786	
Wear appropriate shirt/kurta (need not zip or			**Hygiene**			.774	

button)											
Combs, applies oil to hair and plaits									.774		
Applies powder/ bindi									.687		
Informs appropriately for menstrual hygiene and shaving									.686		
Use public restrooms independently and Appropriately									.676		
Shows interest in drawing /painting										.862	
Play with pet animals										.846	
Engages self in hobbies such as stamp collecting,3D image collecting, coin collecting etc.										.840	
Participates in religious activities		**Art/Recreation**								.823	
Performs art & craft activities such as clay modelling bottle painting etc.										.689	
Dances to the favourite tune of film songs										.607	
Express going to restaurant/hotels										.559	
Points out preferences, orders and eats in a public dining facility											.893
Ask permission to use the items that belongs to others											.863
Request for help		**Expression**									.815
Convey simple messages											.772
Aware of the functions of various body parts											.737
Differentiates between boy and girl											.585

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Reliability

S.No.	Factors	Item	Reliability
1	Cleanliness	8	0.83
2	Interpersonal	10	0.89
3	Shopping	7	0.84
4	Games/sports	7	0.77
5	Reception	6	0.81
6	House hold	7	0.90
7	Hygiene	8	0.85
8	Art/recreation	7	0.80
9	Expression	6	0.91
	Overall Independent living skills	**66**	**0.85**

VI. Conclusion

This study performed with an intention to identify the reliable and valid measures to evaluate the functional academic and independent living skills of children with ASD (12-16 Age groups). Concerning the measurement of Functional academics skills of children with ASD (12-16 Age group) there are 67 questions with 9 dimensions, and measurement of Independent living skills of children with ASD (12-16 Age group) has 66 questions with 9 dimensions. Factor analysis and Cronbach's alpha test was performed to identify the consistency and reliability. The results of those tests concluded both measuring scales are consistent and good reliability which can be used for a brief description and evaluation of functional academics and independent

living skills of ASD along with using as a curriculum.

Acknowledgement

Conflicts of Interest

There are no conflicts of interest.

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