

## **Impact of Computer-Aided Educational Applications on Communication and Learning**

### **Abilities of the Autists**

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#### **Abstract**



*Computer-aided instructions have significant potential in increasing the educational experiences and facilitating the development of children with special needs (autistic children). Early intervention for autistic children helps their learning, language, and communication skills. This study aimed to explore the perceptions of parents of autists and speech therapists regarding the use of computer-aided educational applications to improve the communication and learning of Autistic Students. A critical paradigm was used for this study, under this paradigm, mixed methods research was used. Under mixed methods research, an explanatory sequential design was used. All the parents of autists and speech therapists of Lahore were considered the population for this study. A purposive sampling technique was used to determine the desired sample size from the population. Seventy-three parents of autists and twenty-eight speech therapists participated in the study. For the quantitative phase, the purposive sampling technique was used. For the qualitative phase, only those parents of autists using mobile/computer applications for student communication and language development were selected. Four instruments were used in this study. The reliability for the parents of autists' questionnaire was  $\alpha=.77$  and for the speech therapists' questionnaire was  $\alpha=.96$ . Data was analyzed using SPSS. It is concluded that parents of autists and speech therapists have average to high perceptions (based on their means) regarding the usage of educational applications. However, positive perceptions were shared by the speech therapists and parents of autists about the educational applications using these applications for specific purposes. It is also noted that an individualized set of activities are essential for autistic children.*

**Keywords:** Autism Spectrum Disorder, Communication, Language, Learning

#### **Introduction**

Language is a vast system of communication in which humans communicate with each other. Communication is conveying information from one person to another to develop a shared understanding (Velentzas and Broni, 2014). According to Alokla (2018) there are various modes and styles of smooth communication. Mostly, it is deliberate or accidental, involving irregular or typical signs. According to Jacklin and Farr (2005) for many of us, communication is a straightforward and easy process without any hassle as we learn and interpret information unproblematically our whole lives.

Alokla (2018) stated that communication skills, which include verbal and non-verbal language skills, are crucial in developing social bonds among children and adults alike. But unfortunately, children with Autism have minimal communication skills, hence learning. Cadette (2015) reported that most children have difficulty learning a language which affects their communication and social interactions in their daily life. Children with autism frequently wrestle with interpreting and responding to social situations. For example, Autistic children have minimal perceptions of the world outside them, have no social relationships except their immediate family, and face difficulty responding to stimuli. Furthermore, they lack the organizational skills necessary as a child to be in an individual and social setup (Kraleva, 2017).

Thakur et al. (2020) quoted that according to the American Psychiatric Association Diagnostic Manual (2013) the autistic disorder is known as “Pervasive Developmental Disorder,”

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which is responsible for limiting development in three significant areas which are as follows: i) delayed / abnormal communication patterns; ii) social interaction and iii) repetitive behaviors and interests. In simple language, there are three common main symptoms of Autism in children.

1. Delayed milestones
2. Socially awkward child
3. Trouble in verbal and non-verbal communication

Eissa (2015) highlighted that one of the primary criteria for diagnosis of autism is to focus on the slow communication development in children, which primarily depends on the level of autism. Therefore, individuals working with ASD must be attentive to the issues related to communication.

Fahey and Reid (2000) further discussed the implications of ASD on the development of communication characteristics. Some children may produce words in infancy but experience delays in their language between 18 and 30 months. This is due to the variation in the disorders found along the spectrum. It was noted that almost 50% of individuals diagnosed with ASD would never develop functional language.

According to the Autism Society of America (1994) due to the problem of autism, the child usually encounters many issues in critical areas of developmental milestones such as; vocal & other communication domains, socialization and related personal interactional problems, imaginary/creative play and also low to higher levels of concerns in sensory processing. Jordan (1999) said that children with autism learn faster with a computer because they do not feel stressed interacting with another person. Rahbar et al. (2011) and Imran et al. (2011) that it is apparent from the context of this study that a substantial gap exists between Autism and the use of computer applications in the Pakistani context. Very few studies are available to know the learning problems of autistic children and how parents and professionals (speech therapists) are helping them in learning and communication development. Knowledge of Autism among healthcare professionals in Pakistan and the factors influencing it. Therefore, this study aimed to explore the perception of the usage of Mobile and computer-aided applications for autistic children from parents, speech therapists, and computer teachers of different autistic centers in the Lahore district. The researcher tried to explore the effect of mobile and computer-aided applications on Autistic Children's Language and Communication Development.

#### ***Objectives of the Study***

The study also has the following objectives:

1. To determine parents of autistic perceptions of using computer applications to learn Language and Communication Development.
2. To discover speech therapists' perceptions regarding computer applications for Language and Communication Development.
3. To see the age and gender of parents of autistic and speech therapists affect perceptions regarding the utility of speech /language apps.

#### ***Problem statement***

There is so much research in this field and which methods and tools influence autistic children's language and learning. Early intervention in autistic children's language and communication is beneficial. Technology and electronic apps are valuable in the education and medical fields. So, the researcher tried to investigate the effects of mobile and computer applications on autistic children's language and communication.

#### ***Research Questions***

The study also has the following questions:

1. What are parents of autistic perceptions regarding using computer applications to learn about Language and Communication Development?
2. What are speech therapists' perceptions regarding using computer applications for finding out Language and Communication Development?
3. Do the age and gender of parents of autistic and speech therapists affect perceptions regarding the utility of speech /language apps?

#### ***Research Design and Methodology***

The study was conducted to explore the perceptions of parents of autists & speech therapists about using mobile applications on autistic children's language and communication development. Under the critical paradigm, the researchers used mixed methods research design. Under mixed methods

research, the explanatory sequential design was used by keeping in mind the research objectives and questions. This design emphasizes the quantitative analysis, followed by interviews or observation (qualitative measures) to help explain the quantitative finding and analysis.

Fig. 1 Explanatory Sequential Design (QUANàqual)



**Quantitative phase:** For the quantitative phase, purposive sampling technique was used. The researcher used closed ended questions.

Sample size: 73 parents and 28 speech therapists participated in the study.

**Qualitative phase:** For the qualitative phase, a purposive sampling technique was used. For this purpose, the following criteria were selected:

1. Only those parents were contacted who reported that they are using the computer and mobile applications for their autistic child.
2. The semi- structured interviewed with open ended questions are used.

To find out the perceptions of parents and speech therapists regarding the use of mobile applications for autistic’ communication and learning development, three instruments were used in this study.

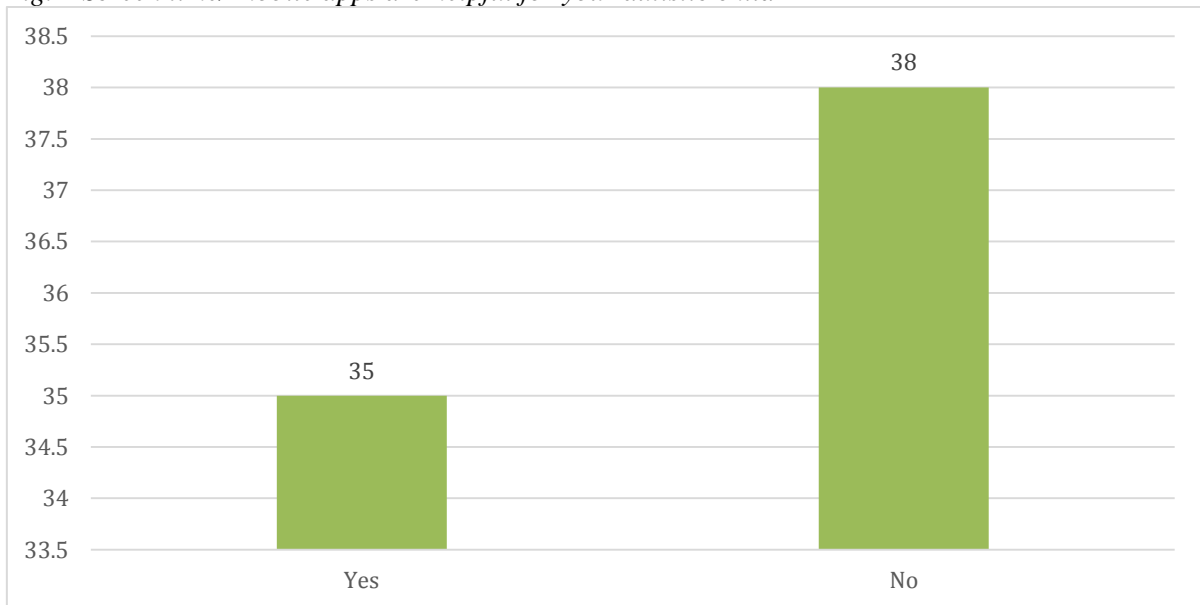
1. Questionnaire for parents
2. Questionnaire for speech therapists
3. Interview protocol

SPSS software was used to analyze the data.

**Analysis of data and findings**

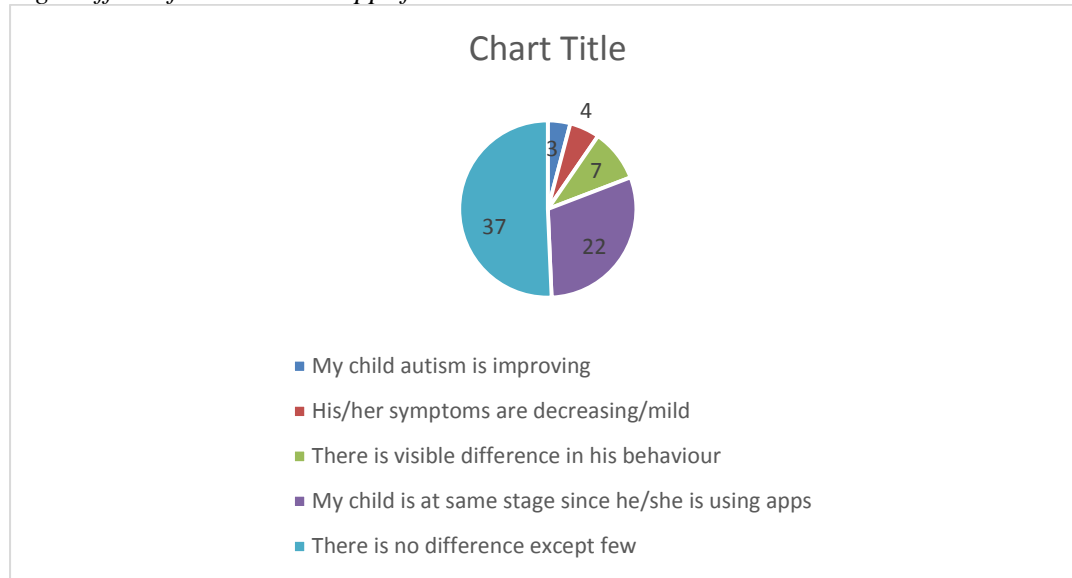
**Parents perceptions about mobile/computer apps**

Fig. 2 Screen time/ mobile apps are helpful for your autistic child



Above figure 2 shows that 38 parents (52.1%) believe that screen time or using mobile app for autistic children are not helpful. However, 35 parents (47.9%) believed that mobile/computer apps are useful for such children.

Fig.3 Effect of these mobile apps for children



Above figure 3 indicates that 37 parents (50.7%) said that there is no difference of these apps on autistic children except few. Only 11 said that have seen a difference.

**Descriptive Analysis**

**Table 1**

Mean and SD for each response for parents of autists

Sr. No	Statements	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean	SD
After/During using computer/mobile app, my child:								
1	Responds appropriately to humorous stimuli (e.g., laugh at jokes, cartoons, funny stories)	2 (2.7)	5 (6.8)	42 (57.5)	20 (27.4)	4 (5.5)	2.73	.78
2	Understand the instructions given to him/her	3 (4.1)	9 (12.3)	7 (9.6)	36 (49.3)	18 (24.7)	2.21	1.08
3	Initiate conversation with family members	5 (6.8)	26 (35.6)	11 (15.1)	19 (26.0)	12 (16.4)	2.90	1.24
4	Initiate conversation with peers	6 (8.2)	7 (9.6)	19 (26.0)	22 (30.1)	18 (24.7)	2.73	2.68
5	Starts to pay attention to what peers are doing	6 (8.2)	8 (11.0)	30 (41.1)	17 (23.3)	12 (16.4)	2.71	1.12
6	Imitate other people in games or learning activities.	3 (4.1)	12 (16.4)	22 (30.1)	29 (39.7)	7 (9.6)	2.65	1.00
7	Follow other’s gestures to look at something (e.g., when the other person nods head, points, or uses other body language cues).	10 (13.7)	11 (15.1)	15 (20.5)	33 (45.2)	4 (5.5)	2.86	1.17
8	Seems attracted to other people's attention	4 (5.5)	18 (24.7)	19 (26.0)	24 (32.9)	8 (11.0)	2.80	1.10
9	Showed minimal expressed pleasure when interacting with others	5 (6.8)	13 (17.8)	15 (20.5)	28 (38.4)	12 (16.4)	2.60	1.16
10	Displays excitement in showing toys or objects to others	5 (6.8)	14 (19.2)	15 (20.5)	31 (42.5)	8 (11.0)	2.68	1.11
11	Seems interested in pointing out things in the environment to others.	5 (6.8)	17 (23.3)	15 (20.5)	24 (32.9)	12 (16.4)	2.71	1.1
12	Displays social communication (e.g., say “bye-bye” in response to another person saying “bye-bye” to him or her).	34 (46.6)	9 (12.3)	11 (15.1)	13 (17.8)	6 (8.2)	3.71	1.41
13	Try to make friends with other people.	7 (9.6)	7 (9.6)	22 (30.1)	31 (42.5)	6 (8.2)	2.69	1.07
14	Engaged in creative, imaginative	10	11	12	28	12	2.71	1.29

Sr. No	Statements	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean	SD
	play	(13.7)	(15.1)	(16.4)	(38.4)	(16.4)		
15	Becomes frustrated quickly when he or she cannot do something	41 (56.2)	16 (21.9)	6 (8.2)	5 (6.8)	5 (6.8)	4.13	1.23
16	Becomes upset when routines are changed	19 (26.0)	20 (27.4)	18 (24.7)	10 (13.7)	6 (8.2)	3.49	1.24
17	Responds good when given commands, requests, or directions	11 (15.1)	15 (20.5)	20 (27.4)	19 (26.0)	8 (11.0)	3.02	1.23
18	Shows an extreme reaction (e.g., cries, screams, tantrums) in response to loud, unexpected noise	8 (11.0)	18 (24.7)	15 (20.5)	22 (30.1)	10 (13.7)	2.89	1.24
19	Use exceptionally precise/small speech	8 (11.0)	10 (13.7)	24 (32.9)	20 (27.4)	11 (15.1)	2.79	1.19
20	Language has been clear and improved	22 (30.1)	12 (16.4)	11 (15.1)	20 (27.4)	8 (11.0)	3.27	1.42
21	Attaches very concrete meanings to words	8 (11.0)	12 (16.4)	17 (23.3)	23 (31.5)	13 (17.8)	2.71	1.25
22	Talks about a single subject excessively	6 (8.2)	15 (20.5)	14 (19.2)	22 (30.1)	16 (21.9)	2.63	1.26
23	Speech is abnormal in tone, volume, or rate.	36 (49.3)	7 (9.6)	12 (16.4)	12 (16.4)	6 (8.2)	3.75	1.42
24	Does respond to own name when called out among two others	11 (15.1)	1 (1.4)	23 (31.5)	29 (39.7)	9 (12.3)	2.67	1.19
25	Seldom says "yes" or "I"	8 (11.0)	12 (16.4)	16 (21.9)	23 (31.5)	14 (19.2)	2.68	1.26
26	Repeats phrases over and over	33 (45.2)	8 (11.0)	9 (12.3)	12 (16.4)	11 (15.1)	3.54	1.55
27	Uses 0-5 spontaneous words per day to communicate wants and need	6 (8.2)	18 (24.7)	24 (32.9)	14 (19.2)	11 (15.1)	2.91	1.17
28	Learns a simple task but "forgets" quickly	7 (9.6)	18 (24.7)	16 (21.9)	22 (30.1)	10 (13.7)	2.86	1.21
29	Has "Special abilities" in one area of development, which seems to rule out mental issues	11 (15.1)	13 (17.8)	20 (27.4)	23 (31.5)	6 (8.2)	3.0	1.20
30	Strong reactions to changes in routine / environment	39 (53.4)	4 (5.5)	9 (12.3)	13 (17.8)	8 (11.0)	3.27	1.5
31	Uses at least 15 but less than 30 spontaneous phrases daily to communicate	5 (6.8)	7 (9.6)	22 (30.1)	25 (34.2)	14 (19.2)	2.5	1.1

The first objective was to determine parents of autistic perceptions of using computer applications to learn Language and Communication Development. The above table (1) indicated that for the following statements, the mean value is high as autists (S15) become frustrated quickly when he or they cannot do something (M= 4.13). (S23), Their speech is abnormal in tone, volume, and rate (M=3.75). Similarly, (S26) they (autists) repeat phrases over and over (M=3.54) and (S16) they become upset when routines are changed (M=3.49), and (S30) they show strong reactions to changes in the environment (M=3.27). For the rest of the statements, parents have moderate perceptions regarding their child's behaviors regarding communication and learning.

**Inferential Statistics**

**Table 2**

*Difference between Mean Scores of parents of autists based on Gender (N= 28)*

ST	N	Mean	Std. Deviation	def.	t	Sig
Male	13	93.07	13.07	19.418	.502	.62
Female	60	91.01	14.92			

\*p < .005 (2-tailed)

The third objective was to see how the gender of parents affect perceptions regarding the utility of speech /language apps. Table (2) indicates the overall mean values for male (M= 93) and female parents (M=91). Thus, the Null hypothesis is rejected as the p-value" (.62) is greater than 0.05. It was found that there is no difference in the perceptions of parents based on gender.

**Table 3**

*One- Way ANOVA: Difference between Mean Scores of parents of autists by Age*

	SS	def.	Mean Square	F-ratio	Sig.
Between groups	2909.39	2	1454.68	8.260	.001
Within groups	12327.86	70	176.112		
Total	15237.26	72			

\*\*p < .005 (2-tailed)

The third objective was to see how the age of parents affect perceptions regarding the utility of speech /language apps. Table (3) indicates a significant difference in perceptions between the groups based on age. That is why further analysis post- Hoc Tukey-HSD was applied and presented next.

**Table 3(a)**

*Post hoc Test for Difference in parents on the basis of Age*

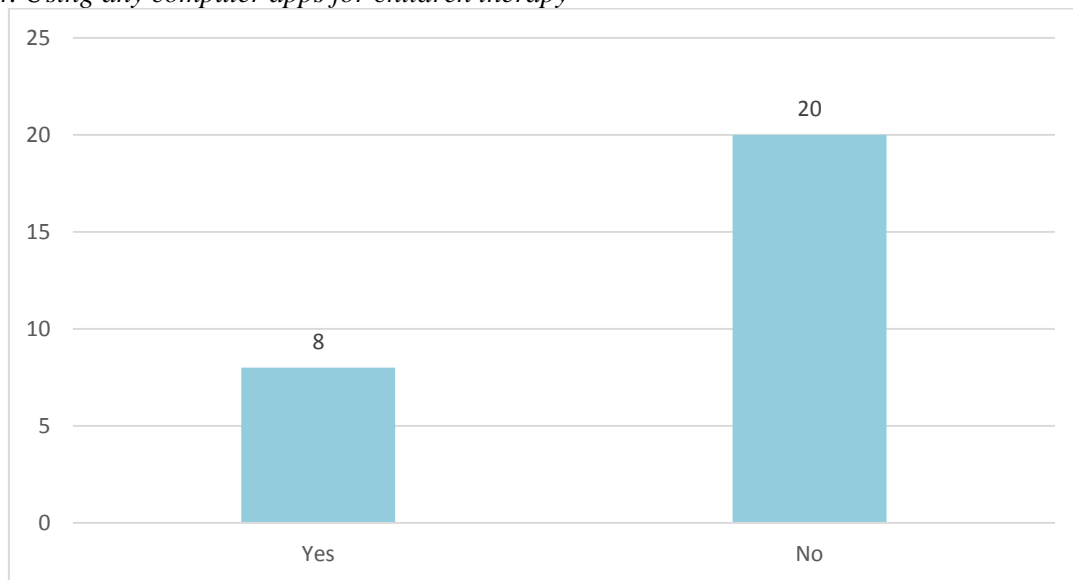
Age	age	Mean difference	p-value
26-30	31-35	13.21	.001
31-35	36 or more	-11.73	.013

\*\*p < .005 (2-tailed)

This table (3a) revealed that parents belonging to age group 26-30 and 31-35 has significant difference their perceptions from parents’ age groups 31-35 and 36 or more.

**Perception of Speech Therapists**

*Fig 4. Using any computer apps for children therapy*



Above figure 4 shows that mostly speech therapists 20 (71.4%) are not using any computer apps followed by 8 (28.6%) speech therapists are using computer apps.

**Descriptive Analysis**

**Table 4**

*Mean and SD of Speech Therapist Statements*

Sr. No	Statement	SA	A	N	D	SD	M	SD
1	Responds appropriately to humorous stimuli (e.g., laugh at jokes, cartoons, funny stories)	2 (7.1)	5 (17.9)	11 (39.3)	10 (35.7)	0	2.97	.922
2	Understand the instructions given to him/her	2 (7.1)	16 (57.1)	4 (14.3)	6 (21.4)	0	2.92	.979
3	Initiate conversation with family members	2 (7.1)	16 (57.1)	4 (14.3)	6 (21.4)	0	3.21	1.03
4	Initiate conversation with peers	2 (7.1)	4 (14.3)	12 (42.9)	10 (35.7)	0	2.64	.826
5	Starts to pay attention to what peers are doing	2 (7.1)	6 (21.4)	12 (42.9)	8 (28.6)	0	2.79	.875
6	Imitate other people in games or learning activities.	2 (7.1)	14 (50.0)	6 (21.4)	6 (21.4)	0	3.14	1.00

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Sr. No	Statement	SA	A	N	D	SD	M	SD
7	Follow other's gestures to look at something (e.g., when the other person nods head, points, or uses other body language cues).	2 (7.1)	10 (35.7)	7 (25.0)	9 (32.1)	0	2.89	.994
8	Seems attracted to other people's attention	0	4 (14.3)	12 (42.9)	12 (42.9)	0	2.71	.712
9	Showed minimal expressed pleasure when interacting with others	2 (7.1)	7 (25.0)	6 (21.4)	13 (46.4)	0	2.92	1.01
10	Displays excitement in showing toys or objects to others	0	9 (32.1)	10 (35.7)	9 (32.1)	0	3.00	.816
11	Seems interested in pointing out things in the environment to others.	0	9 (32.1)	11 (39.3)	8 (28.6)	0	3.03	.792
12	Displays social communication (e.g., say "bye-bye" in response to another person saying "bye-bye" to him or her).	2 (7.1)	10 (35.7)	6 (21.4)	10 (3.7)	0	3.14	1.00
13	Try to make friends with other people.	0	7 (25.0)	11 (39.3)	10 (35.7)	0	2.89	.785
14	Engaged in creative, imaginative play	2 (7.1)	7 (25.0)	7 (25.0)	6 (21.4)	6 (21.4)	2.75	1.26
15	Becomes frustrated quickly when he or she cannot do something	6 (21.4)	6 (21.4)	8 (28.6)	8 (28.6)	0	3.35	1.12
16	Becomes upset when routines are changed	8 (28.6)	5 (17.9)	6 (21.4)	5 (17.9)	4 (14.3)	3.28	1.43
17	Responds good when given commands, requests, or directions	2 (7.1)	8 (8.26)	10 (35.7)	8 (28.6)	0	3.14	.931
18	Shows an extreme reaction (e.g., cries, screams, tantrums) in response to loud, unexpected noise	0	4 (14.3)	15 (53.6)	9 (32.1)	0	2.82	.669
19	Use exceptionally precise/small speech	0	9 (32.1)	10 (35.7)	9 (32.1)	0	3.00	.816
20	Language has been clear and improved	0	5 (17.9)	8 (28.6)	15 (53.6)	0	2.64	.780
21	Attaches very concrete meanings to words	1 (3.6)	8 (28.6)	7 (25.0)	10 (35.7)	2 (7.1)	2.85	1.04
22	Talks about a single subject excessively	2 (7.1)	5 (17.9)	8 (28.6)	12 (42.9)	1 (3.6)	2.82	1.02
23	Speech is abnormal in tone, volume, or rate.	1 (3.6)	2 (7.1)	13 (46.4)	12 (42.9)	0	2.71	.762
24	Does respond to own name when called out among two others	0	5 (17.9)	14 (50.0)	9 (32.1)	0	2.85	.705
25	Seldom says "yes" or "I"	0	9 (32.1)	6 (21.4)	12 (42.9)	1 (3.6)	2.82	.944
26	Repeats phrases over and over	4 (14.3)	5 (17.9)	9 (32.1)	10 (35.7)	0	3.10	1.06
27	Uses 0-5 spontaneous words per day to communicate wants and need	0	3 (10.7)	14 (50.0)	11 (39.3)	0	2.71	.658
28	Learns a simple task but "forgets" quickly	0	3 (10.7)	9 (32.1)	14 (50.0)	2 (7.1)	2.46	.792
29	Has "Special abilities" in one area of development, which	0	4 (14.3)	13 (46.4)	7 (25.0)	4 (14.3)	2.60	.916

Sr. No	Statement	SA	A	N	D	SD	M	SD
30	seems to rule out mental issues Strong reactions to changes in routine / environment	0	10 (35.7)	6 (21.4)	12 (42.9)	0	2.92	.899
31	Uses at least 15 but less than 30 spontaneous phrases daily to communicate	2 (71.)	4 (14.3)	6 (21.4)	15 (53.6)	1 (3.6)	2.67	1.02

Second objective was to discover speech therapists’ perceptions regarding computer applications for Language and Communication Development. In this table (4) for the following S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S17, S18, S19, S20, S21, S22, S23, S24, S25, S26, S27, S29, S30, and S31 Speech therapists have moderate perceptions followed by S28 speech therapists have a low perception regarding the use of computer applications for find out Language and Communication Development.

**Inferential Statistics**

**Table 5**

*Difference between Mean Scores of Speech therapists based on Gender (N= 28)*

ST	N	Mean	Std. Deviation	def.	t	Sig
Male	4	83.00	24.24	26	-.749	.461
Female	24	91.00	19.13			

\*p < .005 (2-tailed)

Third objective was to see how the gender of speech therapists affect perceptions regarding the utility of speech /language apps. This table (5) indicated the overall mean values for male (M= 83) and female speech therapists (M=91). Thus, the Null hypothesis is rejected as the “p-value” (.461) is more significant than 0.05. It was found that both male and female speech therapists have no difference in their perceptions regarding using mobile/computer apps.

**Table 6**

*One- Way ANOVA: Difference between Mean Scores of Speech Therapist by Age*

	SS	def.	Mean Square	F-ratio	Sig.
Between groups	4400.444	3	1466.815	5.866	.004
Within groups	6000.984	24	250.041		
Total	10401.429	27			

\*\*p < .005 (2-tailed)

Third objective was to see the age of speech therapists affect perceptions regarding the utility of speech /language apps. In this table (6) there is a significant difference in perceptions between the groups based on age. That is why further analysis post -Hoc Tukey-HSD was applied and presented next.

**Table 6 (a)**

*Post hoc Test for Difference in Speech Therapist on the basis of Age*

Age	age	Mean difference	p-value
21- 25	26-30	-32.44	.025
	31-35	-23.53	.010

\*\*p < .005 (2-tailed)

This table 6(a) revealed that speech therapists belonging to age group 21-25 have significant difference in using computers apps with speech therapists of age groups 26-30 (-32.44) and 31-35 (-23.53).

**Discussion**

First objective of the study was to find out the perceptions of parents of autists regarding the use of computer application for autistic children learning and communication development. On majority of the questions, parents have average awareness and understanding of their Autism child needs and behaviors. A significant number of parents (52.1%) believe that screen time or using mobile apps for autistic children are not helpful (Figure 2). In response to another similar question, majority of the parents (50.7%) said that they have not seen any difference of these apps on autistic children (Figure 3). Similar responses were also highlighted by the qualitative data as parent 1 (P1) said: *Apps were not used much by me; mostly flash cards were used that enhance my child's understanding and help to improve his language. And it is a slow process.*



These findings are also supported by the literature as Stathopoulou et al. (2019) was of the view that certainly, mobile apps provide the greatest opportunity for effective integration of technologically for learning and language development. The responses of parents are in Pakistani context, perhaps they are not aware or trained properly to use the mobile/computer apps to enhance its productivity for their children.

Furthermore, parents (table 1) were asked to respond on the behavior, learning and communication development of their child after using computer/mobile apps. According to parents, their autistic child understands the instructions given to him/her (S2, M=2.21); has started to initiate conversation with family members and peers (S3 & S4, M= 2.90 and M=2.73); Displays social communication (e.g., say “bye-bye” in response to another person saying “bye-bye” to him or her) (S12, M=3.71). Qualitative data also supported current findings as P2 was of the view that: *my child has become quite social but only with cousins and brothers. He has no interaction with strangers yet.*

In response to another question about the use of computer apps and its usefulness for mothers, parents (P1, P2) said that: *the child gets independent and increases his knowledge but when the mother explains the activities it's more useful but many mothers do not know about the activities. After seeing the activities on the apps, the mothers get the ideas and they modify the ideas.*

Second objective of this study was to find out the perceptions of speech therapists regarding the use of computer application for autistic children learning and communication development. On most of the questions speech therapists’ responses were average. When the speech therapists were inquired about the usage of the computer/mobile apps for autistic children, majority of the respondents said (71.4%) that they are not using app (Figure 4).

Furthermore, speech therapists (table 4) were asked to respond on the behavior, learning and communication development of those child under treatment after using computer/mobile app. According to speech therapists, child started to imitate other people in games or learning activities (S6, M=3.14); Displays excitement in showing toys or objects to others (S10, M= 3.00); Displays social communication (e.g., say “bye-bye” in response to another person saying “bye-bye” to him or her (S12, M=3.14); Responds good when given commands, requests, or directions (S17, M=3.14) and learns a simple task but “forgets” quickly (S28, M=2.46).

Similar responses were also highlighted by the qualitative data for this study as one respondent SP (3) told that: *Kids get fed up with the traditional ways the teachers teach and behaviors. If the adults do not accept the change, then how will the student do so it's difficult for them. We do not recommend using 24 hours phone but we tell them to use the apps that are helpful.*

Most of the speech therapists were of the view that children under therapy do respond to own name when called out among two others (S24, M=2.85); Attaches very concrete meanings to words (S21, M=2.85). To support the quantitative data, another respondent that they focus more on the activities rather than app as he (SP) said that: *You can use the computer as a tool for these but basically, my focus is on face-to-face interaction or interaction with peer groups, social interaction and physical interaction although you can use computer apps for learning specific concepts.*

Third objective of the study was to see the difference in parents and speech therapists’ perceptions regarding the autistic children learning and communication development based on demographic variables (gender and age). On the base of age, there is no difference in the perceptions of male and female parents and speech therapists.

However, on the base of age groups, significant difference was found in the perceptions of parents and speech therapists. Similar findings were also supported by Stathopoulou et al. (2019) that age of teachers for using digital/mobile/computer applications is important as senior teachers/educators were more positive than their colleague in using apps and identifying students’ capabilities.

### **Conclusion**

This study aimed to explore the perceptions of parents of autists and speech therapists regarding the use of computer-aided educational applications to improve the communication and learning of Autistic Students. It is concluded that parents and speech therapists have average to high perceptions (based on their means) regarding the usage of educational applications. Majority of the respondents are not aware and have no information about the educational application for autistic children. Therefore, many parents are trusting on the therapy they are receiving from any speech therapist for learning and communication development. However, positive perceptions were shared by the speech

therapists and parents about the educational application who are using these applications for specific purposes. It is also noted that individualized set of activities are important for autistic children.

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