

# A CASE STUDY ON AUGMENTATIVE AND ALTERNATIVE COMMUNICATION (AAC) AND CLASSROOM PARTICIPATION OF CHILDREN WITH CEREBRAL PALSY

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## ABSTRACT

**Introduction:** Augmentative and alternative communication (AAC) systems are considered as one of the effective intervention procedure and approaches for addressing the communication needs of children and adults who have difficulties to communicate with others through speech. AAC systems are acknowledged as a functional means of communication procedure for individuals with complex communication needs. Several study identified that, children with cerebral palsy require physical, cognitive- behavioral, social interaction and communication assistance for participating in the school activities. **Objective:** The main objective of the study was to find out the changes in classroom participation of children with cerebral palsy after introducing the augmentative and alternative communication. **Methodology:** The study was conducted following the single study design in quantitative research method. Single case study design is an observational study design which allows the researcher to observe a treatment in before and after condition in order to make assumption about the effectiveness of the treatment. **Result:** The result shows positive changes in classroom participation of children with cerebral palsy after using AAC. The mean score of the participants before introducing AAC in classroom was 22.5 and after using the AAC it was 67 which indicated that, the mean score of the participants was improved by 44.5% after inaugurating the AAC in the classroom. **Conclusion:** AAC has positive changes in classroom participation of children with cerebral palsy. Improvement has been shown on communication purpose of function, school participation and social interaction after introduction of the AAC to the children with CP. For improving classroom participation as well as communication skills AAC intervention should be started as early as possible as part of best performance of the children with CP with complex communication needs.

**Keyword:** Classroom participation, Cerebral palsy and Augmentative and Alternative Communication (AAC).

## 1. INTRODUCTION

More than 3 decades, augmentative and alternative communication (AAC) system is known as one of the effective intervention approaches for addressing the communication needs of children and adults who have difficulty for producing speech as a functional means of communication [21]. Communication is one of the major aspects of a

person in their social life. People with severe communication difficulties may require assistance for participating in the community of their own. AAC system is one of the effective intervention strategies for maximizing communication needs who has severe communication difficulties. For providing a AAC system speech and Language therapist have to think about the functional outcome of the system and the individual with severe communication difficulties can use system effectively in different situation of his/her social life [1]. Augmentative and alternative communication is an area of specialized clinical and educational practice that provides communication options and interventions for people with complex communication needs. The term augmentative in this context means supplemental or additional to speech. Augmentative techniques (e.g. gestures and facial expressions) are commonly used when communicating and interacting with others. According to Beukelman and Mirinda, “augmentative and alternative communication is an area of clinical practice that attempts to compensate for the impairment and disability patterns of individuals with severe expressive communication disorders” [3]. Social participants are important for children because it contribute towards the achievement and development of critical life skills such as developing friendships and emotional sense. But children with limited physical abilities and complex communication needs (CCN) have difficulties in participating in school and as well as social context. They occupied in activities with reduce range in limited place and few partners, few same as friends [24]. Dragera, Light & McNaughton found that, children with CCN like cerebral palsy, down syndrome, autism have require AAC because they faces difficulties in their aspects of development such as (a) functional communication skills, (b) Speech development, (c) language development, (d) cognitive/conceptual development, (e) literacy development, (f) social participation, (g) access to education, and (h) overall quality of life. AAC intervention is able to address this area and provide effective and functional outcomes which can increase the communication, language and learning skills for the children with significant communication disabilities [9]. The participation of school activities was restricted for the children with cerebral palsy due to limited physical, cognitive- behavioral and social skills. So for that reason an effective intervention approach need to consider for improving the individuals quality of life. Intervention can include introducing augmentative and alternative communication (AAC) systems for improving the individual’s communication skills [20].

### **1.1: Background and Literature Review**

There are various types of disability among children that play an important role to create barrier in their overall development. A large epidemiology study was conducted in Bangladesh where indicated that children with disabilities aged between 2 to 9 years indicated that the prevalence rare is 6.8% for all types of disabilities (motor, vision, hearing, cognition and epilepsy) and of 1.5% for serious disabilities [14]. The world wide incidence of cerebral palsy is approximately 1.5 to more than 4 per 1000 live births or per children of a define age range [15]. In Bangladesh 1.4 to 2.7 per 1000 live births are affected due to cerebral palsy [23].

A study was conducted on 1268 children with cerebral palsy, and the result of the study was 36% had motor speech problems, 21% had swallowing/ chewing difficulties, 22% had excessive drooling, and 42% had communication impairments [19]. Another study was conducted in China and researchers found that speech and language disorders are one of the major associated impairments in children with CP. Impaired speech functions occur in 38% of children with CP [5]. Children with cerebral palsy or physical disabilities have limited participation in the school and classroom activities due to lack of physical mobility and have difficulties in communicating with others. Children with physical disabilities face a variety of challenges in their classroom setting due to communication difficulties. AAC is recognized as an effective strategy that can be used by the children with disabilities to improve functioning and minimize the environment barriers which is creating an impact on their participation in school or classroom activities. For that reason they referred to speech and language (SLT) services to maximize their communication skills. A speech and language therapist helps them to play an independent role in the interaction activities. Therapy can include introducing augmentative and alternative communication (AAC) system for improving their play an important role for children with cerebral palsy in their education, facilities the acquisition and expression of their knowledge and to enable them in the classroom activities [16]. To improve quality of life and communication skills of the children the speech and language therapist use AAC intervention approach. In last 2 decades significant progress has been noticed in the development of the AAC system [13].

Several researches have been conducted for finding the role of AAC to increase the classroom participants of children with cerebral palsy. A study was conducted by Calculator, and he found AAC system increases the classroom participation of children. He introduced AAC with three participant and he observed that participant are interacting with a border variety of partners, especially classmates and also they shown increase level of active

participation in the classroom and in the school activities [4]. According to the Cumley and Swanson, AAC systems and strategies are a successful method for supplementing the child's natural mode of communication which provides greater opportunities for improving language development, communicative competence and academic achievement. By using AAC aids the children had greater opportunities to initiate and maintain interaction as well as repair communication breakdowns in various communicative situations [6]. A study was conducted by Drager et al in the autism and the effect of AAC and they have found that impairment of communication including delayed or no language development, are one of the three diagnostic criteria for the children with autism. Also they have deficit in social interaction and repetitive stereotyped behaviors. Approximately 50% of children with autism have no functional language skills. For that reason they have difficulty in participate actively in the classroom [8]. AAC is one of reliable option for these children for improving and increasing the participation in the classroom. Another study was conducted on 3 children with intellectual disabilities (ID) for finding out the impact of AAC on symbol comprehension and production. The result focus that after using the AAC the children have increased symbol comprehension and production in variety of environment [11].

### **1.2 Research question**

Does Augmentative and Alternative Communication increase the classroom participation of children with cerebral palsy?

### **1.3 Objective of the study**

#### **General objective of the study**

To find out the changes in classroom participation of the children with cerebral palsy after introducing the augmentative and alternative communication.

#### **Specific objectives of the study:**

- To find out the classroom participation of the children with cerebral palsy before using augmentative and alternative communication system
- To find out the classroom participation of the children with cerebral palsy after using augmentative and alternative communication system.

## **2. METHODOLOGY**

### **2.1 Study design**

The researcher was chosen the design in quantitative research method because in this way investigator was able to use a large number of participants and can able to get numerical information from the participants [12]. In quantitative research method single case study design was chosen by the researcher for meet the study aim though an effective way for collecting data. Depoy and Gitlin, point out that, "in a single case study design only one study of a single unit of analysis is conducted" [7]. Nesy and Zechmeister, point out that, single case study design is a observational; study design which is allow the researcher to observed a treatment in before and after condition in order to make assumption about the effectiveness of the treatment [17].

### **2.2 Study Population**

Children with cerebral palsy who have communication difficulties and studied at inclusive educational program with aged between 6 – 12 years irrespective of their gender, religious and ethnicity.

### **2.4 Sample**

- Children with cerebral palsy with communication difficulties
- Studies at inclusive educational program

## 2.5 Sampling procedure

The investigators used convenience sampling method for conducting the study. According to Depoy & Gitlin, convenience sampling methods are also called as accidental, volunteer or opportunistic sampling [7]. The researcher will also use the method in the study because it can be studied most easily, cheaply and quickly [2]. The investigator used this sampling method because in convenience sampling the sample is easy to collect, also the sample is near at hand and likely to respond. So it will be helpful for the investigator to work this sampling method throughout the study.

## 2.6 Sample size

Higher percentage of sample can show true representation of population so conducting a research it is many samples better to get as much as possible [22]. For conducting the study the investigators choose single case study design. So for considering this fact researcher allows 2 participants as a sample in this study.

## 2.7 Sample selection criteria

### ✓ Inclusion criteria

- Children with cerebral palsy who were in special education program
- Age level was between 6-12 years
- Both boys and girls with cerebral palsy were included

### ✓ Exclusion criteria

- Age level below 6 years and above 12 years was excluded
- Children who already used AAC

### ✓ Rational for inclusion criteria

Investigator set this inclusion criteria because in special needs school the investigator can able to get available participant. According to [18], at the age of 12 years a typical child develops his/her language skills, cognitive and social skills.

## 2.8 Method of data collection

The investigator used observational checklist (functional communication measure) for collecting data in the study. The investigator went to the participants/ parents/teachers for taking permission for knowing that either they are interested in the study or not. During the period of data collection the investigator introduced him in front of the participant and then explains the purpose of the study.

## 2.9 Data collection tool

To measure the children's participation in classroom context, an observational checklist was developed. Three aspects are included in the checklist (a) communication purpose of function (b) school participation (c) social interaction.

## 2.10 Data collection materials

For collecting data the researcher will use checklist as an observational tool (functional communication measure).

## 2.11 Data analysis

Data analysis is a crucial part of any study or research. For data analysis there are many statistical methods but researcher used Descriptive statistical analysis. Descriptive analysis allows for describing huge amount of information with just a few indices like frequency it's one of major advantages [10].

### 3. RESULT

#### 3.1 Demographic information of the Participants

The demographic data of the participants is presented in the following table:

**Table 1: Demographic information of the participants**

Participants' Code	Age (years)	Sex	Diagnosis	Functional Mobility
P1	7	Male	Cerebral Palsy	Use wheelchair
P2	12	Female	Cerebral Palsy	Independently mobile

In the summary, the total number of participant was 2 and their age range was between 7 to 12 years. Among 2 participants, 1 participant was male and 1 participant was female.

#### 3.2 Participant Training Process for the Introduction of Augmentative and Alternative Communication

**Table 2: Participant Training Process for the Introduction of AAC**

Participants' Code	Total sessions (2 hours per session)	Participant Compliance	Training Style
P1	24	High	Modeling
P2	24	Medium	Modeling

#### 3.3 Overall Changes to Functional Communication following AAC intervention

In the following table the total findings of the outcome measures represent that, the mean score of participants before introducing the AAC in classroom was 22.5 and after the AAC it was 67. As a result the mean score of the participants was improved by 44.5% after introducing the AAC in the classroom.

**Table 3: Total scores on functional communication measurement tool before and after AAC intervention**

Participants	Total outcome measure Before	Total outcome measure After
P1	26	81
P2	19	53
Mean Score	22.5	67

#### 3.4 Average Frequency of Function before and after Introducing AAC

The investigators analyzed the data by using 'descriptive analyses' for finding out the changes in the areas of communication purposes of functions, school participation and social interaction. In the following table the investigator is presented the mean score of these areas.

**Table 4: Mean in outcome measurement of different areas**

Different areas of outcome	Mean	
	Before	After
Communication purposes of functions	11.5	42.5
School participation	6.5	11
Social interaction	4.5	13.5

Before introducing the AAC the mean score of communication purposes of functions was 11.5 and after the AAC it was 42.5. In school participation, before introducing the AAC the mean score was 6.5 and after the AAC it was 11. In terms of social interaction, there was a moderate upward trend observed with 4.5 to 13.5 before and after using the AAC.

In the following table the investigator presented the average frequency of use of communicative functions on different areas.

**Table 5: Average frequency of function on different areas**

Average frequency of function on different areas	Before					After				
	1	2	3	4	X	1	2	3	4	X
Communication purpose of functions	44%	7.9%	0	0	47.4	26.3	31.6	34.2	7.9%	0
					%	%	%	%		
School participation	62.5	12.5	25%	0	0	0	37.5	50	12.5	0
	%	%					%	%	%	
Social interaction	50%	20%	0	0	30%	10%	40%	40%	30%	0

- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Emerging, beginning, or rarely</li> <li>2. Occasionally, when highly motivated, or only when preferred</li> <li>3. Often or frequent, but inconsistent or limited to familiar conditions</li> <li>4. Consistently under most or all condition with reliability</li> </ol> <p>X Not observed</p> |
|---|

### 3.5 Communication purposes of functions

The table represents the mean score in the area of communication purpose of functions. Before introducing the AAC the mean score of the participants was 11.5 and after the AAC it was dramatically improved to 42.5 in the classroom.

**Table 6: Mean of Communication Purpose of functions**

Participants	Communication purpose of function Before AAC	Communication purpose of function After AAC
P1	15	53
P2	8	32
Mean Score	11.5	42.5

#### 3.5.1 Groups of Communication purpose of functions

**Table 7: Average frequency of Groups of Communication purpose of functions**

Groups of Communication purpose of functions	Before					After				
	1	2	3	4	X	1	2	3	4	X
Social communication	38.9 %	16.7 %	0	0	44.4 %	27.8 %	33.3 %	38.9 %	0	0
Tangible request	42.9 %	0	0	0	57.1 %	21.4 %	35.7 %	28.6 %	14.3 %	0
Approve and reject	100 %	0	0	0	0	0	25 %	50 %	25 %	0
Information request	0	0	0	0	100 %	100 %	0	0	0	0

This table illustrated the average frequency of groups of communication purpose of functions in five different sections before and after introducing the AAC to the participants. The data indicated that, the communication purpose was increased by the participants after getting the benefits of AAC in five different measurement sections.

### 3.6 School participation

The below table represents that, the mean score of participation before using AAC in classroom was 6.5 and after using the AAC it was 11. In summary, the mean score of the participants was improved after introducing AAC in the classroom.

**Table 8: Mean of School participation**

Participants	Before ACC	After AAC
P1	6	11
P2	7	11
Mean Score	6.5	11

#### 3.6.1 Average frequency of School participations

**Table 9: Average Frequency of School Participation**

Participants	Before					After				
	1	2	3	4	X	1	2	3	4	X
P1	75	0	25	0	0	0	50	25	25	0
	%		%				%	%	%	
P2	50	25	25	0	0	0	25	75	0	0
	%	%	%				%	%		

The table shows the information about the school participations of the participants before and after using the AAC where the data represented that the participations gradually went up after using the AAC.

### 3.7 Social interaction

The following table highlighted the mean score of social interaction of the participants before and after using the AAC in the classroom.

**Table 10: Mean of Social interaction**

Participants	Before ACC	After AAC
P1	5	17
P2	4	10
Mean Score	4.5	13.5



### 3.7.1 Average frequency of Social interaction

**Table 11: Average frequency of Social interaction**

Participants	Before					After				
	1	2	3	4	X	1	2	3	4	X
P1	20	40	0	0	40	0	20	20	60	0
	%	%			%		%	%	%	
P2	80	0	0	0	20	20	60	20	0	0
	%				%	%	%	%		

The table was point out the average frequency of the social interaction of the participants before and after using the AAC. Where the data revealed that, after the AAC there was a moderate growth of improvement observed by the participants in the area of social interaction.

## 4. DISCUSSION

### 4.1 Overall Changes to Functional Communication Following Augmentative and Alternative Communication Intervention

The investigators discovered from the study that 2 participants showed a large number of changes in total score on functional communication measurement tool before and after AAC intervention.

### 4.2 Communication Purpose of Functions

There was a significant changes noticed in communication purpose of function after introducing AAC in the classroom by the researches from the study. The total findings in the area of communication purpose of function represent that, the mean score of participants before introducing the AAC in classroom was 11.5 and after introducing the AAC was 42.5 in classroom. As a result the mean score of the participants was improved after the introducing of the AAC in the classroom. Before introducing AAC to the participants 1 (P1) the communication purpose of function was 15 and after introducing the AAC the communication purpose of function were 53. A study was conducted by Pennington, and he found that AAC is one of the effective intervention techniques in which children is able to produce expressive language and communicate ideas, feelings and thoughts other than basic requests for objects in their immediate environment and response to others' questions [20]. According to Pratt, Baker and Spira, find out that AAC technology improved the children participation in classroom activities and also improve the functional tasks (greetings, requesting, protest etc) which were performed throughout the school day [19].

### 4.3 School Participation

From the study, the investigators identified that two participants are showed a large number of changes in the area of school participation after introducing the AAC. The total findings in the area of school participation represent that, the mean score of participants before introducing the AAC in classroom was 6.5 and after introducing the AAC was 11 in classroom. As a result the mean score of the participants was improved after introduction of the AAC to the participant 1 (P1) the school participation was 6 and after introducing the AAC to the participation was 11. Before introducing the AAC to the participants 2 (P2) the school participation was 7 and after introducing the AAC the school participation was 11.

### 4.3 Social interaction

In the case of social interaction, the investigators witnessed an improvement of the participants after using the AAC in the classroom. The total findings in the area of social interaction represent that, the mean score of participants before introducing the AAC in classroom was 4.5 and after introducing the AAC it was 13.5 in classroom. As a result the mean score of the participants was improved after introducing AAC in the classroom. Before introducing AAC to the participant 1 (P1) the social interaction was 5 and after introducing the AAC it was 17. Same scenario has been noticed for the participant 2 (P2) the social interaction was 4 and after introducing the AAC the school participation was 10. This indicates that two participants are showed a large number of changes in the area of social interaction.

## 5. CONCLUSION

In Bangladesh the use of AAC in classroom and school is not very common. So there are many people who have no idea about AAC and how AAC intervention allows the children for participating in the classroom as well as school environment. Children with cerebral palsy require physical, cognitive- behavioral and social skill for participating in the school activities. The participation of school activities was restricted for the children with cerebral palsy due to limited physical, cognitive, and social skills. For improving and increasing the participation in the school and classroom activities the children needs an assistive technology or AAC.

## 6. REFERENCES

- [1] Augmentative and alternative communication (2004). Retrieved from: [http://www.speechpathologyaustralia.org.au/library/Clinical\\_Guidelines/AAC.pdf](http://www.speechpathologyaustralia.org.au/library/Clinical_Guidelines/AAC.pdf)
- [2] Bailly, D.M. (1991). *Research for health professional* (2<sup>nd</sup> ed.). Philadelphia: F.A. Davis Company.
- [3] Beukelman, D. R. & Mirenda. P. (1998). *Augmentative and alternative communication*. U.S.A. Paul H. Brookes Publishing Co., Inc.
- [4] Calculator, S.N. (1999). AAC outcomes for children and youths with severe disabilities: when seeing is believing. *Augmentative and Alternative Communication*, 15 (1), 4-12. Retrieved from HINARI database.
- [5] Chen, C.L., Lin, K.C., Chen, C.H., Chen, C.C., Liu, W. Y., & Chung, C.Y. (2010). Factors associated with motor speech control in children with spastic cerebral palsy. *Chang Gung Medical Journal*, 33(4), 415-423. Retrieved from HINARI database.
- [6] Cumley, G.D., & Swanson, S. (1999). Augmentative and Alternative communication option for children with developmental apraxia of speech: three case studies. *Augmentative and alternative communication*, 15 (2), 110-125. Retrieved from HINARI database.
- [7] Depoy, E., & Gitlin, L.N. (1998). *Introduction to research: understanding and applying multiple strategies* (2<sup>nd</sup> Ed.). London: Mostby.
- [8] Drager, D.R.K., Postal, J.V., Carrolus, L., Castellano, M., Gagliano, C., & Glynn, J. (2006). The effect of aided language modeling on symbol comprehension and production in 2 preschoolers with autism. *American journal of speech language pathology*, 15 (2), 112-125. Retrieved from HINARI database.
- [9] Dragera, K., Light, J., & McNaughton, D. (2010). Effects of AAC interventions on communication and Language for young children with complex communication needs. *Journal of Pediatric Rehabilitation Medicine: An Interdisciplinary Approach*, 3 (4), 303-310. Retrieved HINARI database.
- [10] Fraenkel, R.J., & Wallen, E.N. (2000). *How to design and evaluate research in education* (4<sup>th</sup> ed.). London. Mc Graw Hill.
- [11] Harris, D.M., & Reichle, J. (2004). The impact of aided language stimulation on symbol comprehension and production in children with moderate cognitive disabilities. *American Journal of Speech Language Pathology*, 13 (2), 155-167. Retrieved from HINARI database.
- [12] Hicks, C.M. (2000). *Research methods for clinical therapists*, (3<sup>rd</sup> ed). London. Churchill Livingstone.
- [13] Imms, C. (2008). Children with cerebral palsy participate: A review of the literature. *Disability and rehabilitation*. 30 (24), 1867-1884. Retrieved from HINARI database.
- [14] Khan, N. Z., Ferdous, S., Munir, S., Huq, S., & McConachie, H. (1998) Mortality of urban and rural young children with cerebral palsy in Bangladesh. *Development Medicine & Child Neurology*, 40 (11), 749-753. Retrieved from HINARI database.

- [15] Kirby, R.S., Wingate, M.S., Braun, K.V.N., Doernberg, N.S., Arneson, C.L., Benedict, R. E.,... Allsopp, M.Y. (2011). Prevalence and functioning of children with cerebral palsy in four areas of the United States in 2006: A report from the autism and developmental disabilities monitoring network. *Research in developmental Disabilities*, 32 (2), 462-469. Retrieved from HINARI database.
- [16] Murchland, S., & Parkyn, H. (2011). Promoting participation in school work: assistive technology use by children with physical disabilities. *Assistive Technology*, 23 (2), 93-105. Retrieved from HINARI database.
- [17] Nessel, J. J.S., Zechmeister, E. B., & Zechmeister, J.S. (2003). *Research methods in psychology*. (6<sup>th</sup> ed.). New York. McGraw Hill.
- [18] Owens E.R. 2001, Language development. (5<sup>th</sup> ed.). U.S.A. 160 Gould Street, Needham Height.
- [19] Parkes, J., Hill, N., Platt, M.J., & Donnelly, C. (2010). Oromotor dysfunction and communication impairments in children with cerebral palsy: a register study. *Developmental Medicine & Child Neurology*, 52 (12), 1113-1119. Retrieved from HINARI database.
- [20] Pennington, L., Goldbart, J., Marshall, J. (2011). *Speech and Language therapy to improve the communication skills of children with cerebral palsy (Review)*. Retrieved from HINARI database.
- [21] Romski, M., & Sevcik, R. A. (2005). Augmentative communication and early intervention myths and realities. *Infants & Young Children*, 18 (3), 174-185. Retrieved from HINARI database.
- [22] Stein, F., & Culter, S.K.(2000). Clinical research in occupational therapy (4<sup>th</sup> ed.). San Digo, California.
- [23] Tabir, S.B. (2009). Prevalence of childhood disability cerebral palsy in the community. Retrieved from-[http://www.gtid.net/acmr\\_19/pdf/57.pdf](http://www.gtid.net/acmr_19/pdf/57.pdf).
- [24] Thirumanikam, A., Raghavendra, P., & Olsson, C. (2011). Participation and social networks of school-age children with complex communication needs: A descriptive study. *Augmentative and Alternative Communication*. 27 (3), 195-204. Retrieved from HINARI database.

