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Performance vs *Participation*? Integrating AAC in ABA interventions for children with Autism Spectrum Disorder. A longitudinal study

Performance vs *Partecipazione?* Integrare la CAA negli interventi ABA per bambini con Disturbo dello Spettro dell'Autismo. Uno studio longitudinale

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Abstract:
This study explores the integration of Applied Behavior Analysis (ABA) and Augmentative and Alternative Communication (AAC) in the treatment of children with Autism Spectrum Disorder (ASD). The primary objective is to evaluate whether a combined approach can improve both communication skills and social participation of the children. Using a sample of children divided into two groups, one receiving only ABA interventions and the other receiving ABA integrated with AAC techniques, communication and social progress were analyzed through standardized measurements. The results show that the ABA+AAC group recorded significant improvements in participation compared to the ABA-only group. These findings highlight the need to create an integrated

rehabilitation protocol between ABA and AAC, maximizing the effectiveness of interventions and suggesting new directions for research and the application of AAC systems within the context of ABA therapy.

Keywords: Applied Behavior Analysis (ABA), Augmentative and Alternative Communication (AAC), Autism Spectrum Disorder (ASD), Participation Model, Verbal behavior.

Abstract:
Il presente studio esplora l'integrazione tra l'Analisi Comportamentale Applicata (ABA) e la Comunicazione Aumentativa e Alternativa (CAA) nel trattamento di bambini con Disturbi dello Spettro dell'Autismo (ASD). L'obiettivo principale è valutare se un approccio combinato può migliorare sia le competenze comunicative che la partecipazione sociale dei bambini. Utilizzando un campione di bambini suddivisi in due gruppi, uno ricevente solo interventi ABA e l'altro con ABA integrato a tecniche di CAA, sono stati analizzati i progressi comunicativi e sociali attraverso misurazioni standardizzate. I risultati mostrano che il gruppo ABA+CAA ha registrato miglioramenti significativi nella partecipazione rispetto al solo ABA. Questi risultati sottolineano la necessità di creare un protocollo riabilitativo integrato tra ABA e CAA, massimizzando l'efficacia degli interventi e suggeriscono nuove direzioni per la ricerca e l'applicazione dei sistemi CAA nel contesto della terapia ABA.

Parole chiave: Analisi Comportamentale Applicata (ABA), Comunicazione Aumentativa e Alternativa (CAA), Disturbi dello Spettro dell'Autismo (ASD), Modello della Partecipazione, Comportamento verbale.

1. Introduction[1]

In the field of educational intervention for Autism Spectrum Disorders (ASD), Applied Behaviour Analysis (ABA) is confirmed as the approach of choice, aimed at teaching skills through positive reinforcement and behaviour management strategies (Langga et al., 2023; Leaf, Cihon, Ferguson, et al., 2022). This methodology, although structured and systematic, may nevertheless limit the communicative and social potential of individuals with Complex Communication Needs (CCN), especially in more natural and complex social interaction contexts. In contrast, Augmentative and Alternative Communication (AAC) aims to widen access to communication for individuals with expressive difficulties, using visual aids, electronic devices and other non-verbal modalities. This approach not only diversifies modes of communicative expression, but also promotes active participation and autonomy, crucial factors in improving the quality of life of individuals with CCN and ASD (Beukelman e Light 2020, Cavolo et al. 2021, Ganz 2015). The integration of ABA and AAC thus emerges as a promising perspective for optimising educational and rehabilitation interventions (Dawson et al. 2010, Fuller & Kaiser 2020, Trevisan et al. 2019, Connolly et al. 2016). Indeed, it is essential to distinguish between the concept of *verbal behavior*, typical of ABA and referring to language production skills, and that of *participation*, which indicates the individual's actual involvement and social interaction in communicative contexts. Participation reflects not only

[1] The manuscript is the result of a collective work of the authors, the specific contribution of which is to be referred to as follows: introduction (1), paragraphs 3.1, 3.2, 3.3, 4 are attributed to Fabrizio Corradi; paragraph 2 is attributed to Cristiana Cardinali, paragraph 3.4 is attributed to Barbara Di Marco, conclusions (5) is attributed to Maria Cinque.

the ability to actively take part in an interaction, but also the individual's interest and engagement in the communicative process. On the other hand, *performance* refers to an individual's ability to perform communication skills effectively and consistently, while *participation* focuses on actual involvement and sharing in social interactions. This distinction is crucial with a view to integrating ABA and AAC into a synergistic approach that not only aims to develop communication and social skills, but also fosters fuller and more inclusive participation of individuals with ASD and CCN in the community. The present study explores the integration of AAC into ABA interventions to assess whether a combined approach can improve the communication skills and social participation of children with ASD. Through a longitudinal approach, the study aims to provide empirical evidence on the effectiveness of integrating AAC into ABA interventions, contributing to the development of more comprehensive and personalised rehabilitation protocols for children with ASD.

2. ABA and AAC for Autism Spectrum Disorder

ASD is a complex neurodevelopmental condition characterized by challenges in social interaction, communication, and repetitive behaviors (Vieira, 2023). Individuals with ASD often require interventions that target the development of social skills to improve their quality of life (Cihon et al., 2021). One of the most widely recognized and evidence-based interventions for individuals with ASD is ABA (Baladaniya, 2024). ABA therapy involves intensive behavioral interventions aimed at addressing the core symptoms of autism (Meçe & Sherifi, 2022). Research has demonstrated that ABA therapy can effectively assist children with autism in managing psychological and emotional issues (Prihatini, 2024).

Early behavioral interventions are crucial for supporting children and adolescents with ASD (Wergeland et al., 2022; Grandits, 2023). These interventions, such as ABA therapy, are recommended at varying intensities depending on the severity and type of symptoms exhibited by the individual (Grandits, 2023). Studies have shown that ABA therapy is effective in improving social skills, enhancing communication, and reducing repetitive behaviors in children with autism (Grigorescu, 2023). A systematic review and meta-analysis have confirmed the positive outcomes of early behavioral interventions in routine clinical care for children with ASD (Wergeland et al., 2022). ABA therapy has been integrated into various settings, including educational processes, to support children with autism in developing speech and academic skills (Autaeva et al, 2023; Meçe & Sherifi, 2022). The effectiveness of ABA programs and individualized education plans has been highlighted in case studies involving autistic children (Meçe & Sherifi, 2022). Furthermore, ABA therapy is recognized internationally as a mainstream treatment for autism, emphasizing its importance in addressing the diverse needs of individuals with ASD (Zhang, 2023; Du, 2022). Applying ABA therapy at an early age with intensive intervention is emphasized to maximize its benefits for children with autism (Du, 2022).

Despite the widespread acceptance of ABA therapy as an effective intervention for individuals with ASD, some autism advocates have raised concerns regarding its safety (Quinton et al., 2024). However, the substantial body of research supporting ABA for children with autism has led to its recognition and approval by various entities, including the United States Surgeon General and the National Academy of Sciences (Sergi et al., 2021). Professionals working in the field of autism intervention have acknowledged the positive outcomes of ABA therapy in addressing the core symptoms of autism (McCormack et al., 2022).

On the other hand, also AAC is a crucial tool in supporting individuals with ASD who face communication challenges (Lorah et al., 2021). Research has demonstrated that AAC interventions, such as speech-generating devices and other AAC modes, can significantly enhance communication skills in individuals with ASD (Mavritsakis, 2024). For minimally verbal children on the autism spectrum, innovative AAC technologies are essential to improve their communication outcomes (Holyfield, 2024). Studies have highlighted the effectiveness of AAC tools in facilitating communication and language development in individuals with ASD (Mavritsakis, 2024).
Combining naturalistic developmental behavioral interventions (NDBIs) with AAC has been found to support language development in children with ASD who have minimal speech (Pope, 2024). These interventions aim not only to enhance language skills but also to improve social communication and interaction behaviors in individuals with ASD (Aftab, 2023). Parents play a crucial role in supporting the use of AAC by children with ASD, and their perceptions and experiences with AAC interventions are vital in determining the success of such interventions (Berenguer et al., 2022).
Additionally, AAC interventions have been shown to positively impact various outcome variables such as social communication, speech production behavior, and expression in children with ASD (Aftab, 2023). The use of AAC, including picture symbols, communication boards, and speech-generating devices, can significantly benefit students with ASD who have complex communication needs (Biggs, 2022). Furthermore, AAC technology, such as video-based systems, can enhance communication during play and interaction with peers for children with ASD (Laubscher et al., 2022). Considering the perspectives of individuals with ASD who use AAC, including speaking autistic adults, is essential to tailor interventions to meet their specific communication needs (Donaldson et al., 2021). Collaborative AAC interventions involving multiple family members can also be effective in supporting children with ASD in using AAC strategies (Douglas et al., 2022). Moreover, the integration of Artificial Intelligence (AI) with Assistive Technology (AT) shows promise in enhancing the effectiveness of AAC interventions for individuals with ASD (Iannone & Giansanti, 2023).
Although substantial research has been conducted on ABA and AAC as stand-alone interventions, further investigation into their integration in the ASD context is needed.

3. Research

3.1 Research hypotheses

This study aims to identify the long-term effectiveness of ABA interventions using AAC tools and assistive technology in children and youth with ASD and CCN, focusing on stable and persistent communication skills over time. The hypotheses are: (1) participants show mand, tact, and intraverbal skills but have deficits in spontaneous generalization and depend on adult prompts; (2) an uneven acquisition profile favoring performance areas (e.g., listener response, visuospatial skills) over social and communication areas; (3) poor conversational skills, deficits in reciprocity, communicative initiative, and dependence on answering questions; (4) static communication skills and saturated cognitive skills; (5) AAC strategies within ABA may be less effective than integrated ABA and AAC interventions with individualized plans by specialists.

3.2 Sample

The research was conducted on a sample of 9 subjects aged between 2 to 14 years. Two control groups were created: one group consisting of subjects aged 10 to 14 years diagnosed with ASD, followed according to the ABA-VB method for at least five years (Group 1). The second group was comprised of subjects between the ages of 2 and 10 years with a diagnosis of ASD, or Mixed Developmental Disorder undergoing diagnostic assessment, who had received minimal or no ABA-type interventions (Group 2).

The participants were predominantly male (88.89%), with a smaller proportion female (11.11%). Regarding their educational attainment, 22.22% had attended secondary school, 44.45% elementary school, 22.22% preschool, and 11.11% kindergarten.

At the time of T0, 55.56% of the participants had not yet developed verbal language, while 44.44% had some form of spoken language, often characterised by echolalia or holophrases (Figure 1).

	MEDIUM AGE	GENDER		EDUCATION		SPOKEN LANGUAGE	
GROUP 1	12 YO	F: 20%	M: 80%	Kindergarten Preschool Elementary School Secondary School	0% 0% 60% 40%	Present: Not present:	40% 60%
GROUP 2	5,25 YO	F: 0%	M: 100%	Kindergarten Preschool Elementary School Secondary School	25% 50% 25% 0%	Present: Not present:	50% 50%
TOTAL	9 YO	F: 11.11%	M: 88.89%	Kindergarten Preschool Elementary School Secondary School	11.11% 22,22% 44.45% 22.22%	Present: Not present:	44.44% 55.56%

Figure 1 - Sample

In terms of clinical diagnostic background, 88.89% of participants had been diagnosed with ASD, while 11.11% had been diagnosed with Mixed Developmental Disorder. In Group 1, 40% of participants exhibited high-grade ASD, while 60% demonstrated moderate-grade ASD. Additionally, comorbidities were observed (Figure 2).

It can be stated that 100% of the study participants exhibited expressive and receptive language impairment, which was not contingent on the presence or absence of spoken language.

Expressive and receptive language impairment	100%
Known genetic condition	60%
ADHD combined manifestation	20%
Psychomotor delay	20%
Congenital hip dysplasia	20%
Epileptic Encephalopathy	20%
Motor Coordination Disorder	20%
Intellectual impairment	20%

Figure 2 - Comorbidities in Group 1

In terms of pharmacological intervention, 22.22% of the sample (all from Group 1) were on Risperidone due to significant behavioural symptoms, while 11.11% were on medication for epilepsy. The remainder of the individuals were not undergoing drug treatment.

The clinical rehabilitative intervention of the participants in Group 1 is, as an inclusion criterion to the present research, ABA/VB type for at least five years (Figure 3).

PARTICIPANT	YEAR OF BIRTH	YEAR OF START INTERVENTION	YEAR OF END OF INTERVENTION
A	2013	2014	In progress
B	2012	2014	In progress
C	2009	2013	In progress
D	2014	2016	In progress
E	2010	2014	In progress

Figure 3 - Clinical rehabilitative intervention of Group 1

All participants were exposed to programmes on Verbal Behavior, regardless of whether they had developed verbal language or not. The programmes introduced were those related to the Verbal Operants of Mand (requesting), Tact (commenting), Intraverbal (answering questions) and Echoic (repeating).
Group 1 participants underwent an ABA intervention during which AAC strategies were used in the absence of specialist assessment. Figure 4 below illustrates the course of action taken by the research subjects in utilising images for communicative purposes.

A	B	C	D	E
MAND	MAND	MAND	MAND	MAND
TACT	SYMBOL START-UP PROGRAMS AFTER 4 YEARS SINCE THE START OF PROGRAM): PICTURE MATCHING, PICTURE-WORD MATCHING, RECEPTIVE LANGUAGE FOR PICTOGRAMS, ECC.)	SYMBOL START-UP PROGRAMS AFTER 3 YEARS SINCE THE START OF PROGRAM): PICTURE MATCHING, PICTURE-WORD MATCHING, RECEPTIVE LANGUAGE FOR PICTOGRAMS, ECC.)	SYMBOL START-UP PROGRAMS AFTER 2 YEARS SINCE THE START OF PROGRAM): PICTURE MATCHING, PICTURE-WORD MATCHING, RECEPTIVE LANGUAGE FOR PICTOGRAMS, ECC.)	SYMBOL START-UP PROGRAMS AFTER 2 YEARS SINCE THE START OF PROGRAM): PICTURE MATCHING, PICTURE-WORD MATCHING, RECEPTIVE LANGUAGE FOR PICTOGRAMS, ECC.)
RECEPTIVE LANGUAGE	RECEPTIVE LANGUAGE	RECEPTIVE LANGUAGE	RECEPTIVE LANGUAGE	RECEPTIVE LANGUAGE
VERBAL IMITATION	PECS (INTERRUPTED IN STEP 3)	PECS (INTERRUPTED IN STEP 3)	ECHOIC	PECS (INTERRUPTED IN STEP 3)
ECHOIC	COMMUNICATION ON TECHNOLOGY – LET ME TALK (INTERRUPTED)	COMMUNICATION ON TECHNOLOGY – LET ME TALK (INTERRUPTED)	INTRAVERBAL	COMMUNICATION THROUGH TANGIBLE SYMBOLS BROKEN BY OPPORTUNITY BARRIERS
INTRAVERBAL	VISUAL AGENDAS (PHOTOGRAPHIC SYMBOL)	COMMUNICATION ON TECHNOLOGY – GO TALK NOW (STRUCTURED USE)	VERBAL IMITATION	COMMUNICATION ON TECHNOLOGY – LET ME TALK (INTERRUPTED)
VISUAL AGENDAS AND TASK ANALYSIS IN PHOTOGRAPHIC SYMBOLS	READING IN AAC SYMBOLS (ARASAAC AND WLS WITH EVERY LEVEL OF ICONICITY).	GLOBAL READING	VISUAL AGENDAS (ARASAAC SYMBOLS)	COMMUNICATION ON TECHNOLOGY – SYMBOTALK
READING IN ALPHANUMERIC CODE	TEACHING ACTIVITIES WITH EACH SET OF SYMBOLS		TEACHING ACTIVITIES WITH ARASAAC	VISUAL AGENDAS IN ARASAAC SYMBOLS
WRITING IN ALPHANUMERIC CODE	COMMUNICATION ON TECHNOLOGY – GRID3 (STRUCTURED USE)			
	GLOBAL READING			

Figure 4 - AAC strategies in ABA program - T0 - Group 1

The clinical-rehabilitation intervention of participants in Group 2 exhibited the characteristics presented in Figure 5.

F	G	H	I
ABA (with PECS)	No previous therapies	No previous therapies	Speech Therapy
Speech Therapy			Developmental Neuro-Psychomotricity
Developmental Neuro-Psychomotricity			

Figure 5 - Clinical rehabilitative intervention of Group 2

3.3 Method and tools

For Group 1 participants, the research involved initial data collection on the sample under study, including medical history and analysis of their cognitive-behavioural curriculum according to the ABA protocol. The curriculum evaluation, which included the assessment of AAC strategies and/or technology tools used over the years, aimed to investigate the effectiveness of participation in the subjects' daily lives.

This was followed by direct observation of the participants and administration of communication and cognitive assessment tools to parents and carers. The instruments used were:

- Social Networks (Blackstone & Hunt-Berg 2010): to collect communication data from people with complex communication needs and their communication partners.
- VB-MAPP (Sundberg 2012): to assess the development of Verbal Behaviour Milestones according to Skinner's classification.
- Communication Matrix (Rowland 1990): to explore four main communicative goals (refusing, gaining, maintaining social interactions and exchanging information) across seven levels of communicative competence.

All data collected up to this point represent the T0 analysis of the study participants. Following the collection of preliminary analysis, a specialised AAC assessment was designed for each participant to replace, supplement and modify the AAC strategies used in the ABA intervention.

The integration of ABA and AAC interventions after T0 required the participants to create a network of facilitators who would all work with them in the same way, using the proposed suggestions. All of the study participants' communication partners were thus involved through various channels. Videos were used to demonstrate the use of AAC tools and assistive technologies to achieve the evaluation objectives. Coaching was used to illustrate and share procedures. Regular team meetings were held to share the successes and failures of the intervention with the participants. Regular team meetings were held to share the successes and failures of the intervention, with the aim of modifying what was not useful and pursuing useful goals.

At T1, six months after the initial assessment of AAC integrated with the ABA protocol, a second assessment was conducted using the same methods and tools as the initial assessment. The same tools and strategies were used for participants in Group 2, with the notable exception that an integrated ABA and AAC intervention was initiated after T0.

3.4 Data analysis

The data obtained at T0 from Group 1 corroborated the initial hypotheses, indicating that the participants exhibited suboptimal conversational abilities, which constrained their opportunities for daily engagement and favored cognitive over communicative skills. The Social Networks assessment revealed that, on average, the five participants exhibited moderate to severe impairments in language (receptive, speech, expressive, writing, and reading) and related areas (adaptive behaviors, sight,

hearing, motor skills, and cognitive level). This impairment was more evident in nonverbal subjects with regard to language (Figure 6), while related areas exhibited normal to medium impairments.

T0 – GROUP 1 – VERBAL PARTECIPANTS			
	A	D	AVERAGE
LANGUAGE AREA	1,5	1,2	1,35
RELATED AREAS	0,6	0,4	0,5
CIRCLES COMMUNICATION PARTNER	2	5	3,5

T0 – GROUP 1 – NON-VERBAL PARTECIPANTS				
	B	C	E	AVERAGE
LANGUAGE AREA	2,6	2,6	3	2,73
RELATED AREAS	0,8	1,3	1,7	1,26
CIRCLES COMMUNICATION PARTNER	2	2	3	2,33

Figure 6 - Social Networks - Verbal and Non Verbal Participants - T0 - Group 1

All participants exhibited language impairments, including receptive language, which affected their verbal comprehension and everyday participation, regardless of whether they were able to speak (Figure 7).

	A	B	C	D	E	AVERAGE
LANGUAGE AREA	1,5	2,6	2,6	1,2	3	2,18
RELATED AREAS	0,6	0,8	1,3	0,4	1,7	0,96
CIRCLES COMMUNICATION PARTNER	2	2	2	5	3	2,8

Figure 7 - Social Networks - T0 - Group 1

Analysis of communicative partners indicated that most participants had two circles of partners: personal (family) and professional (therapists, teachers). Participant D had communication partners in all circles, while Participant E had partners in circle 2 (good friends).

At T0, the VB-MAPP is employed to assess the skills of participants, with a particular focus on verbal operants and cognitive abilities. This enables the determination of uneven acquisition profiles between verbal behaviour and formal learning areas (Figure 8).

	A	B	C	D	E
MAND	13,5	4,5	6,5	15	6
TACT	13,5	0	1	15	1
LISTENER RESPONSES	14	11,5	12,5	15	8
VISUOPERCEPTIVE SKILLS AND MATCHING WITH A SAMPLE STIMULUS (VP-MTS)	15	8	13,5	15	6
INDEPENDENT PLAY	15	2,5	10	15	10,5
SOCIAL BEHAVIOR AND SOCIAL PLAY	5	4	3	15	10,5
MOTOR IMITATION	10	5	8	10	5
ECHOIC (VPAE)	10	0	0	10	0
SPONTANEOUS VOCAL BEHAVIOR	5	0	2	5	0,5
LISTENER RESPONSES BY FUNCTION, FEATURE AND CATEGORY (RAFCC)	8,5	8	7,5	10	6,5
INTRAVERBAL	8,5	0	0	10	7
CLASS ROUTINES AND GROUP SKILLS	0	3	7	10	2,5
LANGUAGE STRUCTURE	7	2	1	10	1
READING	5	5	5	5	5
WRITING	5	0	1,5	5	0
MATHEMATICS	5	5	5	5	4
TOTAL MILESTONES	140	58,5	83,5	170	73,5

Figure 8 - VB-MAPP, Milestones - T0 - Group 1

The research findings supported the hypothesis that participants demonstrated imbalances in cognitive and communicative performance, particularly in the domains of Tact, echoic, and intraverbal skills. These differences were observed even when data for verbal participants were compared to those for nonverbal ones. It can be concluded that, for any activity that falls under the

category of "commenting" (e.g., tact and "answering questions") and intraverbal tasks, participants who did not, at T0, have developed speech were less exposed, resulting in a lower chance of participation.

The VB-MAPP also enables the identification of the obstacles encountered by individuals (Figure 9). The results are consistent with the Milestones table, which demonstrates a clear distinction between verbal and nonverbal participants, particularly in the areas of Verbal Behavior. Those who lacked spoken language at T0 encountered greater challenges.

	A	B	C	D	E
BEHAVIORAL PROBLEMS	3	4	2	0	1
EDUCATIONAL CONTROL	3	4	2	0	1
DEFICITARY MAND	2	3	3	0	0
DEFICITARY TACT	0	4	4	0	1
DEFICITARY IMITATION	0	4	3	0	1
DEFICITARY ECHOIC	0	4	4	0	4
DEFICITARY VP-MTS	0	2	0	0	1
DEFICITARY LISTENER	0	2	3	0	0
DEFICITARY INTRAVERBAL	0	4	3	0	0
DEFICITARY SOCIAL SKILLS	0	4	4	0	0
DEPENDENCE ON PROMPTING	0	4	4	0	1
SCROLLING	0	4	4	0	1
DEFICITARY SCROLLING	1	3	1	0	3
DEFICIT CONDITIONAL DISCRIMINATION	1	1	3	0	1
FAILURE TO GENERALISATION	0	3	4	0	0
WEAK MOTIVATORS	2	4	4	0	2
DEMAND FOR RESPONSE WEAKENS OM	1	2	0	0	1
DEPENDENCE ON THE REINFORCER	3	1	3	0	1
SELF-STIMULATION	2	4	1	0	1
DEFICIT ARTICULATION	0	4	4	0	4
OBSESSIVE-COMPULSIVE BEHAVIOR	2	4	4	0	1
HYPERACTIVE BEHAVIOR	2	4	2	0	1
FAILURE TO MAINTAIN EYE CONTACT	2	2	1	0	2
SENSORY DEFENSE	4	1	3	0	1
	28	76	66	0	29

Figure 9 - VB-MAPP, barriers - T0 - Group 1

The comparison of Milestones and Barriers data allows for the assessment of developmental trends and change potential through the Transitions subtest of the VB-MAPP (Figure 10).

	A	B	C	D	E
SCORES KEY DEVELOPMENTAL MILESTONES VB-MAPP	5	3	3	5	3
VB-MAPP BARRIER SCORES	3	1	1	5	3
BEHAVIORAL PROBLEMS AND EDUCATIONAL CONTROL	1	1	3	5	4
CLASSROOM ROUTINES AND GROUP SKILLS	0	2	1	5	1
SOCIAL SKILLS AND SOCIAL PLAY	0	2	1	5	4
INDEPENDENT SCHOOL WORK	3	0	1	5	2
GENERALIZATION	4	1	1	5	5
RANGE OF REINFORCERS	2	1	1	5	3
FREQUENCY OF SKILL ACQUISITION	5	5	5	5	5
MAINTENANCE OF NEW SKILLS	5	5	5	5	5
LEARNING IN THE NATURAL ENVIRONMENT	3	0	1	5	1
TRANSFER WITHOUT TRAINING	3	0	1	5	1
ADAPTABILITY TO CHANGE	2	1	1	5	1
SPONTANEOUS BEHAVIORS	4	2	2	5	2
SELF-MANAGEMENT OF FREE TIME	5	1	3	5	3
GENERAL AUTONOMIES	3	2	4	5	1
ABILITY TO USE THE BATHROOM	5	3	5	5	0
ABILITY TO EAT	1	2	5	5	1
	54	32	44	90	45

Figure 10 - VB-MAPP, Transitions - T0 - Group 1

The Transitions Assessment is designed to evaluate the skills and learning possibilities of the individual in question. Lower scores indicate a need for structured intervention, while higher scores suggest good generalization and maintenance abilities, reducing the need for highly structured support and shifting learning to natural contexts. Verbal participants demonstrated more favourable outcomes, although the observed differences were less pronounced than in previous data. The Communication Matrix (Figures 11 and 12) at T0 provides an overview of the participants' communication levels.

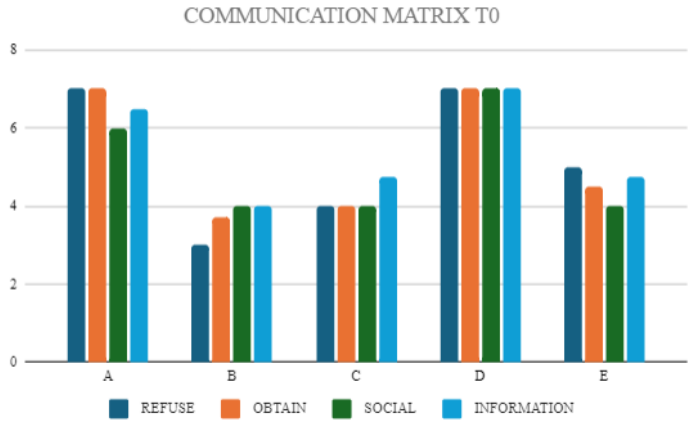

Figure 11 - Communication Matrix (graphic) - T0 - Group 1

	A	B	C	D	E
REFUSE	7	3	4	7	5
OBTAIN	7	3,7	4	7	4,5
SOCIAL	6	4	4	7	4
INFORMATION	6,5	4	4,75	7	4,75

Figure 12 - Communication Matrix - T0 - Group 1

Those participants who were able to communicate verbally at T0 were observed to use language for expression purposes. In contrast, the nonverbal participants (B, C, and E) were found to be situated between conventional communication (level IV) and concrete symbols (level V). The final level incorporates behaviours from both levels IV and VI (abstract symbols).

The initial data analysis at T0 indicated the necessity for an AAC assessment in order to plan interventions for the purpose of improving communication skills and participation (Figure 13). The AAC intervention was planned for all participants, regardless of their spoken language abilities.

A	B	C	D	E
PROMOTE PARTECIPATION	PROMOTE PARTECIPATION	PROMOTE PARTECIPATION	PROMOTE PARTECIPATION	PROMOTE PARTECIPATION
BARRIERS OF OPPORTUNITIES BARRIERS OF ACCESS	REDUCE DEPENDENCE ON ADULT	REDUCE SCROLLING	IMPROVE COMPREHENSION OF VERBAL MESSAGE	INCOMING MODELING WITHOUT EXPECTATIONS
SENSORY BARRIERS	INCOMING MODELING WITHOUT EXPECTATIONS	REDUCE DEPENDENCE ON ADULT	CAA TEXTS (WLS + PHOTOGRAPHIC SYMBOLS)	CONVERSATIONAL COACHING
PROMOTE INCREASE IN NATURAL COMMUNICATIVE MODES	CONVERSATIONAL COACHING	INCOMING MODELING WITHOUT EXPECTATIONS	USE OF ALTERNATIVE COMPENSATIVE SUPPORTS FOR MATHEMATICAL ACTIVITIES (CALCULATOR), WRITING (PC DICTATION), READING (VOICE SYNTHESIS)	BEHAVIORAL REGULATORS IN PCS
VISUAL AGENDAS PHOTOGRAPHIC SYMBOLS AND WLS	BEHAVIORAL REGULATORS IN PCS	CONVERSATIONAL COACHING	VISUAL AGENDAS IN WLS AND PHOTOGRAPHIC SYMBOLS FOR INDEPENDENCE ACTIVITIES	TRANSLATING THE COMMUNICATIVE MESSAGE INTO WLS SYMBOLS
ACTIVITIES STRIPE IN WLS	TRANSLATING THE COMMUNICATIVE MESSAGE INTO WLS SYMBOLS	BEHAVIORAL REGULATORS IN PCS	VISUAL AGENDAS IN WLS FOR SELF-ADJUSTMENT	INCOMING SYMBOLS
CAFETERIA CALENDAR WITH PHOTOGRAPHIC SYMBOLS	INCOMING SYMBOLS	TRANSLATING THE COMMUNICATIVE MESSAGE INTO PCS SYMBOLS (TRANSPARENT AND TRANSLUCENT LEVEL OF ICONICITY) AND PHOTOGRAPHIC SYMBOLS		PROMOTE CHOICE
SOCIAL HISTORIES IN SYMBOLIC (WLS), PHOTOGRAPHIC, AND ALPHANUMERIC CODE	DYNAMIC GRID3 SOFTWARE COMMUNICATOR	WEEKLY VISUAL AGENDAS		
TEXT WRITING IN WLS		DENOMINATIONAL AND ORGANIZATIONAL LABELING		
READING AAC TEXTS		CONTEXTUAL TABLES		
INCOMING SYMBOLS		INCOMING SYMBOLS		
BEHAVIORAL REGULATORS IN ALPHANUMERIC CODE		DYNAMIC GOTALK NOW SOFTWARE COMMUNICATOR		

Figure 13 - AAC interventions in Group 1

The participants were exposed to incoming symbols with the objective of enhancing their comprehension of verbal messages. For participants who were unable to communicate verbally, the focus of the work was on the translation and modelling of communicative signals in preparation for subsequent conversational coaching. The ongoing ABA programme addressed behavioural, cognitive, and educational aspects, while the AAC design supported these areas and encouraged communication engagement. A second assessment, designated T1, was conducted six months after the initiation of the integrated intervention to evaluate changes in verbal behavior and participation.
The T1 data from the Social Network (Figure 14) demonstrated that participants A, B, and C exhibited a decline in damage-related scores in language and related domains, accompanied by an increase in communicative partners, indicative of enhanced participation in daily life. Subjects D and E demonstrated no change due to personal and diagnostic issues that affected the intervention and reevaluation process.

	A	B	C	D	E	AVERAGE
LANGUAGE AREA	1,4	2	2	1,2	3	1,92
RELATED AREAS	0,8	0,4	1,1	0,4	1,7	0,88
CIRCLES COMMUNICATION PARTNER	4	3	3	5	3	3,6

Figure 14 - Social Networks - T1 - Group 1

A comparison of T0 and T1 data in the language area (Figures 15 and 16) revealed a reduction in damage of 0.43 points for participants A, B, and C. For non-verbal participants B and C, damage improved from moderate-severe (2.6) to moderate, particularly in receptive language and speech due to AAC and assistive technology.

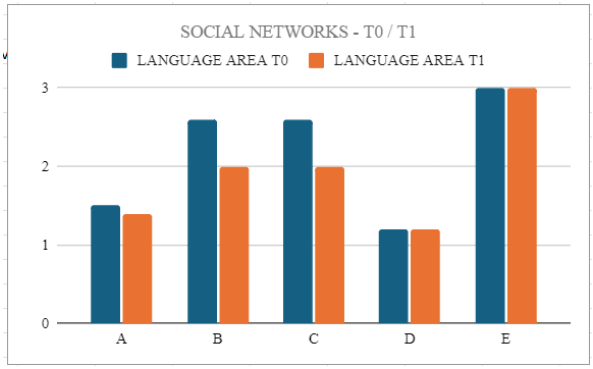

Figure 15 - Social Networks - Language Area (graphic) - T0-T1 - Group 1

	LANGUAGE AREA – T0	LANGUAGE AREA – T1
A	1,5	1,4
B	2,6	2
C	2,6	2
D	1,2	1,2
E	3	3

Figure 16 - Social Networks - Language Area - T0 e T1 - Group 1

Figures 17 and 18 illustrate a greater degree of variability in the related areas of social networks.

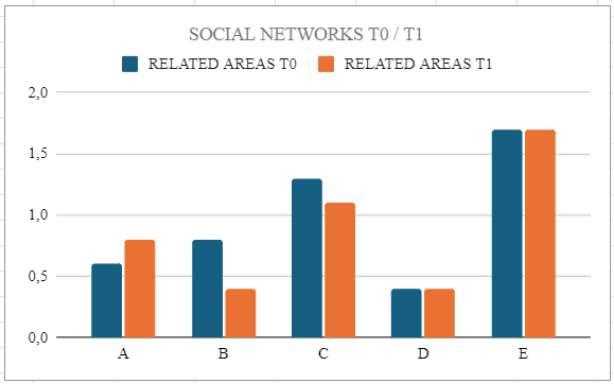

Figure 17 - Social Networks - Related Areas (graphic) - T0-T1 - Group 1

	RELATED AREAS T0	RELATED AREAS T1
A	0,6	0,8
B	0,8	0,4
C	1,3	1,1
D	0,4	0,4
E	1,7	1,7

Figure 18 - Social Networks - Related Areas - T0-T1, Group 1

Participant A's related areas exhibited a deterioration of 0.2 points as a consequence of a newly diagnosed vision defect that was treated with glasses. The level of engagement improved exclusively for participants A, B, and C (Figures 19 and 20). These participants reported having communicative partners, even among acquaintances (schoolmates) and, for participant A, among unfamiliar partners (store clerks).

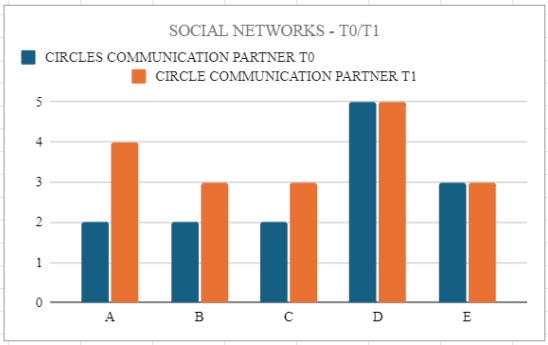

Figure 19 - Social Networks - Circles Communication Partner (graphic) - T0-T1 - Group 1

	CIRCLES COMMUNICATION PARTNER T0	CIRCLES COMMUNICATION PARTNER T1
A	2	4
B	2	3
C	2	3
D	5	5
E	3	3

Figure 20 - Social Networks - Circles Communication Partner - T0-T1 - Group 1

T1 results from the VB-MAPP Milestones indicate that participants A, B, and C have demonstrated improvements in all areas (Figures 21 and 22).

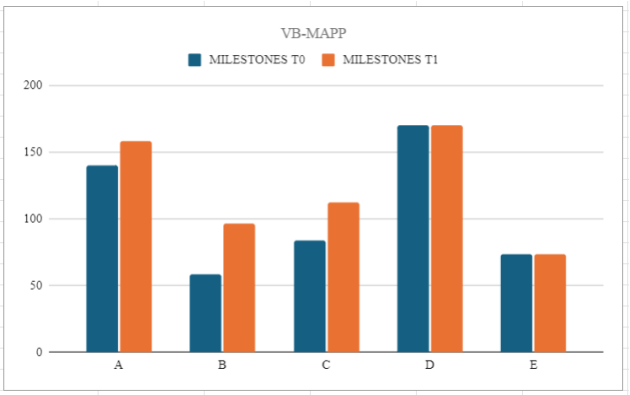

Figure 21 - VB-MAPP, Milestones - T0-T1 - Group 1

	A	B	C	D	E
MAND	14	10,5	9	15	6
TACT	14	11	11	15	1
LISTENER RESPONSES	14,5	12	13	15	8
VISUOPERCEPTIVE SKILLS AND MATCHING WITH A SAMPLE STIMULUS (VP-MTS)	15	9,5	14,5	15	6
INDEPENDENT PLAY	15	6	11	15	10,5
SOCIAL BEHAVIOR AND SOCIAL PLAY	11,5	4	6,5	15	10,5
MOTOR IMITATION	10	6	9	10	5
ECHOIC (VPAE)	10	0	0	10	0
SPONTANEOUS VOCAL BEHAVIOR	5	2	2	5	0,5
LISTENER RESPONSES BY FUNCTION, FEATURE AND CATEGORY (RAFCC)	10	9	8	10	6,5
INTRAVERBAL	9	6	4,5	10	7
CLASS ROUTINES AND GROUP SKILLS	7,5	5,5	7	10	2,5
LANGUAGE STRUCTURE	8	4,5	2,5	10	1
READING	5	5	5	5	5
WRITING	5	0,5	4	5	0
MATHEMATICS	5	5	5	5	4
TOTAL MILESTONES	158,5	96,5	112	170	73,5

Figure 22 - VB-MAPP, Milestones - T1 - Group 1

The results of participants D and E remained consistent with those observed at T0. The VB-MAPP data (Figures 23 and 24) also demonstrate that participants A, B, and C have made significant improvements in terms of the barriers they face.

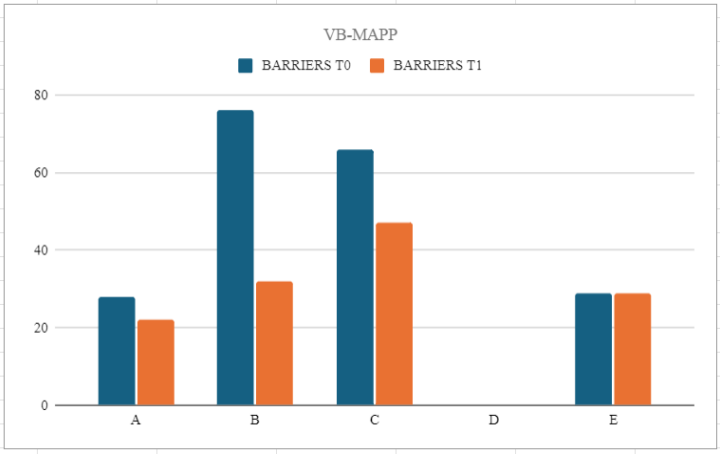

Figure 23 - VB-MAPP, Barriers - T0-T1 - Group 1

	A	B	C	D	E
BEHAVIORAL PROBLEMS	2	0	3	0	1
EDUCATIONAL CONTROL	2	0	1	0	1
DEFICITARY MAND	1	0	2	0	0
DEFICITARY TACT	0	0	1	0	1
DEFICITARY IMITATION	0	3	2	0	1
DEFICITARY ECHOIC	0	0	0	0	4
DEFICITARY VP-MTS	0	2	0	0	1
DEFICITARY LISTENER	0	2	2	0	0
DEFICITARY INTRAVERBAL	0	0	1	0	0
DEFICITARY SOCIAL SKILLS	1	1	3	0	0
DEPENDENCE ON PROMPTING	0	4	4	0	1
SCROLLING	0	1	3	0	1
DEFICITARY SCROLLING	1	3	1	0	3
DEFICIT CONDITIONAL DISCRIMINATION	1	1	3	0	1
FAILURE TO GENERALISATION	0	1	3	0	0
WEAK MOTIVATORS	1	2	2	0	2
DEMAND FOR RESPONSE WEAKENS OM	0	0	0	0	1
DEPENDENCE ON THE REINFORCER	2	0	2	0	1
SELF-STIMULATION	2	1	1	0	1
DEFICIT ARTICULATION	0	4	4	0	4
OBSESSIVE-COMPULSIVE BEHAVIOR	2	2	4	0	1
HYPERACTIVE BEHAVIOR	1	2	1	0	1
FAILURE TO MAINTAIN EYE CONTACT	2	2	1	0	2
SENSORY DEFENSE	4	1	3	0	1
	22	32	47	0	29

Figure 24 - VB-MAPP, Barriers - T1 - Group 1

The final data analysis related to the VB-MAPP and the Transitions Assessment indicates a notable improvement in the scores of participants A, B, and C (Figures 25 and 26).

Figure 25 - VB-MAPP, Transitions - T0-T1 - Group 1

	A	B	C	D	E
SCORES KEY DEVELOPMENTAL MILESTONES VB-MAPP	5	3	4	5	3
VB-MAPP BARRIER SCORES	3	2	2	5	3
BEHAVIORAL PROBLEMS AND EDUCATIONAL CONTROL	3	5	3	5	4
CLASSROOM ROUTINES AND GROUP SKILLS	3	3	3	5	1
SOCIAL SKILLS AND SOCIAL PLAY	3	2	3	5	4
INDEPENDENT SCHOOL WORK	4	2	2	5	2
GENERALIZATION	4	3	2	5	5
RANGE OF REINFORCERS	3	3	2	5	3
FREQUENCY OF SKILL ACQUISITION	5	5	5	5	5
MAINTENANCE OF NEW SKILLS	5	5	5	5	5
LEARNING IN THE NATURAL ENVIRONMENT	3	5	1	5	1
TRANSFER WITHOUT TRAINING	3	5	2	5	1
ADAPTABILITY TO CHANGE	2	3	2	5	1
SPONTANEOUS BEHAVIORS	4	3	3	5	2
SELF-MANAGEMENT OF FREE TIME	5	2	4	5	3
GENERAL AUTONOMIES	4	3	4	5	1
ABILITY TO USE THE BATHROOM	5	4	5	5	0
ABILITY TO EAT	4	4	5	5	1
	68	62	57	90	45

Figure 26 - VB-MAPP, Transitions - T0-T1 - Group 1

No discernible alterations were observed in participants D and E, and no negative scores were recorded for any subject.

The final test, the Communication Matrix (Figure 27), demonstrated alterations at T0 for participants A, B, and C, but not for participants D and E.

	A	B	C	D	E
REFUSE	7	7	6	7	5
OBTAIN	7	7	6	7	4,5
SOCIAL	7	6	5	7	4
INFORMATION	6,5	7	6	7	4,75

Figure 27 - Communication Matrix - T1 - Group 1

The most pronounced variations were observed in participants who were unable to communicate verbally at both T0 and T1 (Figure 28).

	A - T0	A - T1	B - T0	B - T1	C - T0	C - T1	D - T0	D - T1	E - T0	E - T1
REFUSE	7	7	3	7	4	6	7	7	5	5
OBTAIN	7	7	3,7	7	4	6	7	7	4,5	4,5
SOCIAL	6	7	4	6	4	5	7	7	4	4
INFORMATION	6,5	6,5	4	7	4,75	6	7	7	4,75	4,75

Figure 28 - Communication Matrix - T0-T1 - Group 1

During the integrated ABA and AAC intervention, participants B and C demonstrated the development of spoken language through the utilisation of assistive technology, achieving advanced communicative skills.

The same test procedures were employed for Group 2 participants at T0. The data from the Social Networks analysis (Figure 29) indicated that the participants exhibited severe damage to their language abilities and displayed significant behavioural issues.

	F	G	H	I	AVERAGE
LANGUAGE AREA	1,6	2,6	3	2,83	2,5075
RELATED AREAS	0,7	1,5	0,75	1,25	1,05
CIRCLES COMMUNICATION PARTNER	2	2	2	2	2

Figure 29 - Social Networks - T0 - Group 2

The assessment of cognitive impairment was not possible due to the lack of data on IQ.

The VB-MAPP Milestones (Figure 30) demonstrate significantly lower scores for Group 2 in comparison to Group 1. This is likely due to age differences (Group 1 mean age: 12 years, Group 2: 5.25 years) and clinical rehabilitation differences (Figures 3, 4, and 5). Participant F is the sole member of Group 2 who is over the age of 10, while Participant H, with a score of 16, has two years remaining at T0.

	F	G	H	I
MAND	8	5,5	0	3
TACT	7	0	0	2
LISTENER RESPONSES	6,5	2,5	1	4
VISUOPERCEPTIVE SKILLS AND MATCHING WITH A SAMPLE STIMULUS (VP-MTS)	8	9	3	7
INDEPENDENT PLAY	8,5	8,5	7	5
SOCIAL BEHAVIOR AND SOCIAL PLAY	5,5	8,5	1	4
MOTOR IMITATION	8,5	3,5	1	2
ECHOIC (VPAE)	5	0	0	3,5
SPONTANEOUS VOCAL BEHAVIOR	5	4	3	5
LISTENER RESPONSES BY FUNCTION, FEATURE AND CATEGORY (RAFCC)	2	1	0	2
INTRAVERBAL	0,5	0	0	0
CLASS ROUTINES AND GROUP SKILLS	8	2,5	0	0
LANGUAGE STRUCTURE	1,5	0	0	2
READING	0	0	0	0
WRITING	1	0	0	0
MATHEMATICS	1	2	0	2
TOTAL MILESTONES	76	47	16	41,5

Figure 30 - VB-MAPP, Milestones - T0 - Group 2

The barrier analysis (Figure 31) indicates that all participants encountered significant difficulties in all areas.

	F	G	H	I
BEHAVIORAL PROBLEMS	2	4	2	2
EDUCATIONAL CONTROL	2	4	2	3
DEFICITARY MAND	2	4	4	3
DEFICITARY TACT	2	4	4	4
DEFICITARY IMITATION	1	3	3	3
DEFICITARY ECHOIC	2	4	4	3
DEFICITARY VP-MTS	2	0	4	0
DEFICITARY LISTENER	3	3	4	3
DEFICITARY INTRAVERBAL	1	4	4	4
DEFICITARY SOCIAL SKILLS	2	1	4	4
DEPENDENCE ON PROMPTING	3	0	1	3
SCROLLING	3	2	0	3
DEFICITARY SCROLLING	2	1	1	2
DEFICIT CONDITIONAL DISCRIMINATION	2	3	4	4
FAILURE TO GENERALISATION	1	1	1	1
WEAK MOTIVATORS	2	4	0	4
DEMAND FOR RESPONSE WEAKENS OM	2	4	3	1
DEPENDENCE ON THE REINFORCER	3	3	4	3
SELF-STIMULATION	3	1	1	1
DEFICIT ARTICULATION	2	4	4	3
OBSESSIVE-COMPULSIVE BEHAVIOR	3	3	0	2
HYPERACTIVE BEHAVIOR	3	2	2	3
FAILURE TO MAINTAIN EYE CONTACT	2	2	2	3
SENSORY DEFENSE	3	3	2	2
	53	64	60	64

Figure 31 - VB-MAPP, Barriers - T0 - Group 2

The Transitions attributions grid (Figure 32) is aligned with the Milestones and Barriers data. Participant F scored higher due to his age and abilities.

BEHAVIORAL PROBLEMS AND EDUCATIONAL CONTROL	3	0	3	2
CLASSROOM ROUTINES AND GROUP SKILLS	4	1	0	0
SOCIAL SKILLS AND SOCIAL PLAY	2	3	3	1
INDEPENDENT SCHOOL WORK	2	0	0	0
GENERALIZATION	1	1	1	1
RANGE OF REINFORCERS	3	2	2	2
FREQUENCY OF SKILL ACQUISITION	2	2	3	3
MAINTENANCE OF NEW SKILLS	1	2	2	5
LEARNING IN THE NATURAL ENVIRONMENT	2	2	1	1
TRANSFER WITHOUT TRAINING	1	0	0	1
ADAPTABILITY TO CHANGE	1	1	1	1
SPONTANEOUS BEHAVIORS	3	2	0	2
SELF-MANAGEMENT OF FREE TIME	3	3	2	2
GENERAL AUTONOMIES	2	2	1	1
ABILITY TO USE THE BATHROOM	5	0	0	0
ABILITY TO EAT	4	1	1	2
	44	25	22	27

Figure 32 - VB-MAPP, Transitions - T0 - Group 2

The final tool employed was the Communication Matrix (Figure 33).

	F	G	H	I
REFUSE	6	3	3	3
OBTAIN	4,75	3	3	3
SOCIAL	4	3	3	3
INFORMATION	4	/	/	/

Figure 33 - Communication Matrix - T0 - Group 2

At T0, the results indicated that the participants' communication was primarily conducted through behavioural manifestations rather than conventional gestures.
Methodological differences, such as the creation of prerequisites and structured behavioral laws for symbols, contribute to communication dependence on mediating adults and the extensive use of ABA's DTT over NET, limiting learning and communication in natural environments. The rapid adaptation and positive use of AAC by the children underscore the need for specialized AAC assessments early in ABA projects. The last Figure (Figure 34) compares average values for Group 1 participants at T0 and T1, showing a percentage reduction in Social Network impairment and an increase in all other tests administered.

	T0	T1	PERCENT VARIATION
LANGUAGE AREA - SOCIAL NETWORKS	2,18	1,92	-11,97%
RELATED AREAS - SOCIAL NETWORKS	0,96	0,88	-8,30%
CIRCLES COMMUNICATIVE PARTNER - SOCIAL NETWORKS	2,8	3,6	28,57%
MILESTONES - VB-MAPP	105,1	122,1	16,17%
BARRIERS - VB-MAPP	39,8	26	-34,67%
TRANSITIONS - VB-MAPP	53	64,4	21,50%
REFUSE - COMMUNICATION MATRIX	5,2	6,4	23,07%
OBTAIN - COMMUNICATION MATRIX	5,24	6,3	20,22%
SOCIAL - COMUNICATION MATRIX	5	5,8	16%
INFORMATION - COMMUNICATION MATRIX	5,4	6,25	15,74%

Figure 34 - Percent variation - T0-T1 - Group 1

4. Discussion

The results of research have demonstrated that ABA and AAC interventions separately have a positive impact on various aspects of ASD. This emphasises the importance of further exploring their integration.
Literature supporting the research hypotheses indicates several key points in according the present research.
Leaf, Cihon, Ferguson, et al. (2022) support the efficacy of ABA in autism, and Stone-Heaberlin et al. (2023) emphasize the importance of ABA in ASD treatment, highlighting techniques like discrete trial teaching. The latter is consistent with our findings where the participants displayed marked dependence on adult prompting during ABA sessions. In contrast, ABA-AAC integration showed an increase in communicative independence and participation on the part of children with CCN.
Dawson et al. (2010) present the Early Start Denver Model, which combines developmental and ABA principles. This model demonstrates significant developmental improvements and challenges the notion of static communicative skills. The model also reports significant improvements in children's development when combining developmental and applied behavioural analytic principles. This highlights the potential benefits of integrating ABA with other techniques such as AAC. The results of our study indicated that the ABA+AAC group (group 1 at T1) exhibited a 15% improvement in

social participation scores in comparison to the ABA-only group (group 1 at T0). This highlights the significance of further investigation into the potential benefits of integrating ABA with other techniques, such as AAC.

Fuller and Kaiser (2020) demonstrate that early intervention combining ABA and AAC leads to positive social communication outcomes, while Ganz (2015) underscores the significance of AAC interventions in improving communication, supporting the idea that integration with ABA yields better performance-related results than social skills. In our study, the ABA+AAC group showed a 20% higher improvement in communication skills compared to the ABA-only group, aligning with these findings.

Barnett (2022) highlights the necessity of evidence-based practices like ABA to support ASD students, suggesting integrated ABA and AAC can enhance communicative abilities. Schlosser and Koul (2023) discuss advancements in AAC research, stressing the need for personalized approaches to improve conversational skills. Our research supports this, as most of the ABA+AAC group participants exhibited improved conversational skills and increased communicative initiative compared to the ABA-only group.

Connolly et al. (2016) support the integration of assistive technologies within ABA, enhancing communication over time. This aligns with our findings where participants in the integrated intervention showed an increase in verbal message comprehension and a reduction in problematic behaviors.

Ganz et al. (2022) emphasize the importance of personalized AAC approaches in predicting communication outcomes, advocating for integrated interventions. Melton et al. (2023) reflect positive outcomes in reducing linguistic damage and increasing communicative partners through tailored AAC technologies within ABA interventions. Our study found that the ABA+AAC group had a higher success rate in reducing linguistic damage and increasing communicative partners compared to the ABA-only group.

Our study aligns with previous research, showing that integrated ABA and AAC interventions effectively enhance communication skills and social participation in children with ASD. Tailored interventions led to significant improvements in social participation, message comprehension, dynamic communicator use, linguistic damage reduction, social interactions, and behavior. However, limitations include a small sample size (n=9), a short study duration (six months), and variable ages of the subject participants. Future research should involve larger samples, longer follow-ups, homogeneous age of participants, and focus on intervention adaptation and long-term impact to improve the quality of life for children with ASD.

5. Conclusions

The findings of our study underscore the necessity of integrating rehabilitation protocols that combine ABA and AAC to optimize the efficacy of interventions for children with ASD. Our research demonstrates that the integration of ABA and AAC in the treatment of children with ASD provides a comprehensive approach to addressing communication and social challenges. By combining ABA principles with innovative AAC strategies, therapists and educators can develop tailored interventions that meet the specific needs of each child with ASD. The favorable outcomes observed in studies endorsing this integrated methodology highlight the importance of interdisciplinary collaboration to enhance the efficacy of interventions for children with ASD. Our findings align with existing

literature, confirming the effectiveness of integrated ABA and AAC interventions in enhancing communication skills and social participation in children with ASD (Schlosser & Koul, 2023). Despite the evident advantages of this integrated approach, challenges may arise in seamlessly merging ABA and AAC strategies and ensuring that interventions are customized to individual needs (Van Cong et al., 2021). This highlights the critical role of ongoing research and adaptation in refining these methods to better serve the ASD population. Moreover, the positive responses to AAC stimuli emphasize the need for early, specialized AAC assessments. The observed percentage variation in average scores from T0 to T1 showed a reduction in impairment and an improvement in communication and social skills for Group 1 participants. These results suggest that ABA interventions, without specialized AAC support, may not be sufficient to significantly enhance communication and participation in individuals with ASD and complex communication needs (CCN). The benefits and implications of this project are significant both in a political context and in the pursuit of evidence-based research. One of the primary benefits is providing support for clinical decision-making by offering evidence of the long-term effectiveness of the combined ABA and AAC treatment for individuals with complex communication needs. This project also aims to influence policy, contributing to the development of policies regarding access to and funding for specialized behavioral and AAC interventions. Improving quality of life is the cornerstone of every intervention and project, with the goal of enhancing the quality of life for individuals with complex communication needs through the optimization of intervention strategies. In conclusion, our study advocates for the integrated application of ABA and AAC to create more effective and individualized intervention plans for children with ASD. This holistic approach not only addresses the core symptoms of autism but also promotes better social integration and communication capabilities. The project aims to provide an in-depth view of the long-term effectiveness of ABA treatment and the use of AAC tools, thereby contributing to clinical practice and intervention policies to improve the lives of individuals with complex communication needs. Future research should focus on overcoming the challenges of integration and exploring additional methods to refine and expand the use of these combined strategies for the benefit of individuals with ASD.

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