

APPLIED BEHAVIOR ANALYSIS IN SPECIAL AND INCLUSIVE EDUCATION: FROM THEORY TO PRACTICE

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Abstract

The increasing prevalence of students with special needs in inclusive classrooms has prompted teachers to seek and implement innovative teaching methods that support both these students and their peers. Applied Behavior Analysis (ABA) is a scientifically validated approach to learning and behavior modification, widely used in both special and inclusive education. The aim of this paper is to introduce the core principles of ABA and their application in the education of children with special needs. The theoretical section outlines key ABA mechanisms, including positive reinforcement, motivation, systematic progress measurement, and gradual skill shaping. Special attention is given to assessment tools used to identify children's needs and to plan subsequent interventions.

The paper reports a descriptive, longitudinal single-case study without experimental control. The study reflects the progress of a child with autism spectrum disorder (ASD), whose development was systematically monitored across key domains, including receptive understanding, visual discrimination, tacting, and motor imitation. Anonymized data and visual summaries illustrate skill growth observed concurrently with an ABA-based intervention.

The discussion addresses factors that promote successful learning and obstacles that may impede progress (e.g., the intensity of the intervention). The conclusion outlines practical implications for mainstream classrooms and hypotheses for future implementation research, while recognizing that inclusion-related effects were not directly tested in a general education setting in this case.

Keywords: applied behavior analysis, autism, education, inclusive education.

1. Introduction

The number of children with special educational needs, especially those with autism spectrum disorder (ASD), in preschool education is increasing. ASD is typically diagnosed around the age of three; however, some studies (Kubranská & Šoltýsová, 2022) report an average age of diagnosis of five years. This suggests that many preschool facilities educate children showing ASD symptoms, even if they lack an official diagnosis. Teachers must, therefore, explore alternative and innovative methods that address the needs of children with ASD and the broader diversity of all students in the classroom. Educating children and students with ASD requires specialized training for educators and support tailored to students' needs (Aloovi, 2025; Petersson-Bloom, 2023; Stahmer et al., 2015). In education, applied behavior analysis (ABA) has proven highly effective in teaching communication, social skills, academic competencies, and self-help skills. It also helps to reduce maladaptive behaviors while promoting more adaptive alternatives (Cooper et al., 2007). Research conducted by Lovaas (1987), McEachin et al. (1993), Corsello (2005), Axelrod et al. (2012), Healy & Lydon (2013), Waters et al. (2018), Saigh (2022) and others has demonstrated that early, intensive, and consistent behavioral intervention can lead to lasting positive effects for children who receive ABA treatment. The main idea of ABA treatment is that learning happens through reinforcement of behavior. Adjusting and altering environmental factors can make learning more meaningful for students. This method is particularly beneficial for

children with autism, as they thrive in structured, predictable environments with teaching methods based on data.

Applied behavior analysis (ABA) is a scientific approach to understanding and improving human behavior. The primary behavioral principles include motivation, reinforcement, stimulus control, and extinction. Motivation refers to environmental stimuli that influence the value of the reinforcer that follows a behavior and the frequency of the behavior associated with that reinforcer (Cooper et al., 2007). For instance, a person who has been alone for a long time is more likely to seek company. Stimulus control involves anything that signals the availability of reinforcement. A teacher who gives a break to a student every time he starts screaming during a group activity becomes a stimulus whose presence triggers the screaming because it has been reinforced in the past. Reinforcement is anything that increases the likelihood that a behavior will occur (Alberto & Troutman, 2006). It's important to avoid making assumptions about what a student might find reinforcing. A formal preference assessment should be conducted to identify stimuli that might function as reinforcers for certain behaviors. Extinction involves withholding reinforcement for a specific behavior (Vargas, 2020). For example, if a student engages in a behavior to escape a task, the extinction procedure would involve not removing the task as a consequence for that behavior. Methods and procedures used in behavior interventions are based on principles of behavior and learning. Methods such as prompting, shaping, intensive teaching (ITT), and natural environment teaching are often used to teach new behaviors and skills (Vargas, 2020). For instance, prompting can be utilized when teaching a student how to greet others. Shaping or gradually reinforcing closer approximations of the desired behavior can be applied to increase the time a child spends in a group activity. These methods are applied during two teaching formats often used in ABA. Intensive teaching focuses on systematic approaches to teaching skills in a more structured way, while natural environment teaching (NET) emphasizes teaching skills in the natural context where they will be used.

The study presents a case of an ABA-based intervention for a young child with autism. It has two main objectives. Firstly, the study aims to document skill acquisition observed during an ABA-based intervention for a child with autism. Additionally, the study explores the implementation of these methods within inclusive educational settings for students with special needs.

Methodology

Study design

This paper presents a descriptive, longitudinal single-case report following a practice-based service model. No experimental single-case design was implemented. Instead, the change was tracked over time using repeated curriculum-based assessment (VB-MAPP) and cumulative acquisition graphs.

Participant

The participant of the study was a 2.10 years old boy diagnosed with autism. At the beginning of the intervention, he was nonverbal with limited receptive skills. The intervention took place at a center providing behavioral intervention services. The intervention program was developed by a certified behavior analyst, who also supervised the intervention. The program consisted of an ABA-based low-intensity program (4,5 to 6 hours per week) delivered by a trained ABA therapist.

This dosage was substantially lower than the Early Intensive Behavioral Intervention (EIBI) models (Lovaas, 1987).

The intervention began in March 2023, with the parent interview and child observation to collect initial data. The focus was on communication, social behavior, and early academic readiness, including skills such as matching, sorting, identifying colors, and play skills.

The child's legal guardian provided written informed consent for participation and publication of anonymized educational data. All personally identifying information was removed.

Assessment history

Two primary assessment tools were used. The Behavior Language Assessment Form (BLAF; Sundberg & Partington, 2013) was used during the initial meeting. The assessment is a shorter version of the more detailed VB-MAPP assessment (Sundberg, 2014) and helps identify the child's strengths, weaknesses, and learning targets. The results shown in Table 1 indicate that the participant lacked essential skills in all targeted areas. In the cooperation section, he only followed simple instructions when motivated by a powerful reinforcer, such as a toy or food. In the area of requesting, he showed his desire by pulling people toward a desired item or standing by it. In the areas of motor imitation, vocal imitation, labeling items, and match-to-sample or visual discrimination, he was unable to perform any of the tested skills. However, the mother reported that at home, he was matching pictures of car brands*. During the testing, he demonstrated some understanding of spoken language. He followed several instructions, mainly those related to daily routines.

Table 1. Initial assessment using the Behavior Language Assessment Form

	Cooperation	Request	Motor Imitation	Vocal Imitation	Match to Sample (MTS)	Receptive	Labelling
5							
4							
3							
2							
1							
	Will only do one brief and easy response for a powerful reinforcer.	Pulls people, points, or stands by reinforcing items.	Cannot imitate body movements.	Cannot repeat any sounds or words.	Cannot match any objects or pictures to a sample*	Will follow a few instructions related to daily routines	Cannot identify any items or actions

Note: BLAF anchors: 5 = the highest score to 1 = minimum score (see BLAF assessment form, Sundberg & Partington, 2013)

In addition to the BLAF assessment, a learning barrier assessment from VB-MAPP was conducted. One significant concern was a loss of motivation when a response was required. This led to a quick loss of interest in preferred items when simple demands were made. Another area of concern was instructional control. A parent reported instances of noncompliant behavior often accompanied by tantrums and crying. These learning barriers often prevent students from learning and acquiring skills during direct teaching or in naturally occurring situations.

After the initial BLAF assessment, four additional VB-MAPP assessments were conducted during the two years of the intervention program. The VB-MAPP assessment is a developmental assessment based on Skinner's analysis of verbal behavior. Figure 1 shows that the first assessment occurred in May 2023, approximately 2 months after the initial BLAF assessment. The participant only scored in listener behavior by successfully following instructions to complete a simple task. He did not score points in any other areas.

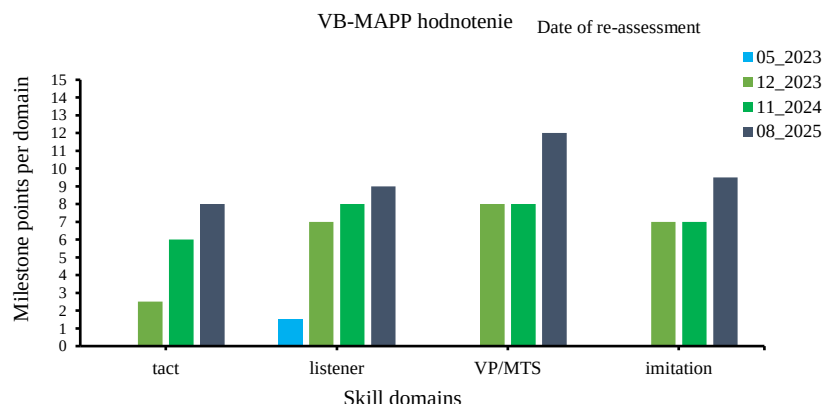


Figure 1. VB-MAPP domain scores across four assessments (May 2023, Dec 2023, Nov 2024, Aug 2025)
Note: Scores represent VB-MAPP milestone totals. Higher values indicate meeting more developmental milestones.

The second assessment took place in December 2023. The improvement was significant in domains such as tact (labeling items), listener behavior, match-to-sample, and motor imitation. During the third assessment in November 2024, he showed improvement in the area of tact (labeling) and continues to enhance his listener behavior. Last, the fourth assessment in August 2025, showed the most significant improvement in the match-to-sample or visual performance area. The improvement was also reported in tact, listener, and motor imitation skills. Based on each assessment, a new or updated individual education plan (IEP) was created every 6 to 8 months, together with appropriate teaching procedures (dated: 05/2023; 10/2023; 05/2024; 02/2025; 06/2025; 09/2025).

Operational definitions and Measurement

Targets. Instructional targets were discrete, directly observable responses defined in the IEP. Tact was defined as the speaker labeling a picture of a common object under nonverbal stimulus control. Listener identification was defined as selecting the correct picture following a verbal stimulus. Visual performance/MTS was defined as selecting a comparison identical to the sample. Motor imitation was defined as reproducing modeled gross or fine motor actions.

Mastery criteria. A target was considered mastered after three consecutive days with correct responding during the initial probe testing (that is, testing without any prompt provided).

Data collection. During intensive teaching (ITT), data were recorded on the first probe trial. If the response was correct, the adult marked “Y” (for “yes”) on data sheets. If the response was incorrect, the adult marked “N” (for “No”) on data sheets. Collected data were digitized weekly. Cumulative graphs summarized the count of mastered targets by domain over time. VB-MAPP milestones were re-assessed at planned intervals and are reported as domain point totals.

Data collection

Progress was measured through independent and correct responses, cumulative targets mastered, and periodic reassessments across all domains.

Cumulative graphs were used to track the number of mastered targets, such as imitated motor movements and identified pictures, both receptively and expressively. This comprehensive data collection ensured an objective evaluation of progress and informed modification to the educational plan as needed.

Intervention

The intervention goals were derived from the VB-MAPP milestones and barriers assessment. Curriculum components included the goals from the following domains:

- instructional control
- requestion (mand)
- labeling (tact)
- receptive language
- motor imitation
- visual discrimination
- group instruction.

In *the early phase of intervention*, the more behavior-oriented goals were selected. As mentioned above, the participant was unwilling to participate in any adult-led activity or instruction, which negatively influenced the participant's ability to acquire new skills. Therefore, the initial focus was on establishing strong instructional control to increase cooperation with an adult, follow instructions (even when the task was not enjoyable), wait for reinforcing items, and transition between activities without displaying challenging behaviors. During this phase, the emphasis was also on teaching imitation skills, which are essential for improving observational learning, that is, learning from the natural environment. Also, a more effective way for him to communicate his needs and wants was addressed. Since the participant was non-vocal (no spoken language), he was taught to use simplified sign language to make requests. The participant learned to ask for items such as his favorite snacks and toys, and to continue in fun activities such as swinging or jumping. As cooperation with an adult improved, additional pre-academic goals were integrated into the intervention program. In *the second phase of the intervention*, the primary focus shifted to improving the participant's receptive language skills, requesting, and labeling objects in his environment. Instructions were delivered through both one-on-one sessions and group activities with other children.

The recent educational plan, dated September 2025, includes additional social skills goals, such as requesting from peers, and preschool skills, including independent work, following multi-step instructions, and participating in group activities. As the participant's primary mode of communication transitioned from sign language to spoken language, current goals emphasize improving articulation and expanding active vocabulary. Throughout all phases of the intervention, the staff focused on the generalization of learned skills across different environments (center and home) and among multiple people. The goal was for the participant to respond appropriately to various people, ensuring that his responses were under the control of instructions rather than influenced by a particular person.

Treatment procedures

The intervention included a variety of ABA-based strategies to evoke positive behavior and effective communication. To teach children any skill, it is necessary to begin by working on cooperation with an adult (Sundberg & Partington, 2013). A variety of preferred toys and activities was incorporated into the teaching sessions to increase participant's engagement with the adult. These included tactile sensory items, coloring materials, iPad games, and movement activities such as swinging, jumping, and sliding. The main goal was to establish the adult as a source of conditioned reinforcement for the participant by associating him with preferred items. That means

that the participant desired to engage with and work alongside the adult. Initially, the adult freely offered favorite items in the absence of problem behavior. As compliance with adults increased during preferred activities, the adult began to deliver the favored items only after completing an easy task (e.g., a puzzle). The *demand fading strategy* (Carbone et al., 2007) allowed the adult to gradually increase the number and difficulty of tasks required before the participant could access the reinforcing items.

Motivation was also used to increase communication skills. The first type of communication the participant was taught was mands (Skinner, 2015). Mands, or requesting, is the only verbal operant that directly benefits the speaker, making it more likely that the participant will learn to use (Sundberg & Partington, 2013). The adult began by identifying the selection of first mands. These included items such as a car, bubbles, an iPad, and a marble, as well as actions like turning on, jumping, or swinging. The process of teaching requesting included capturing and contriving a motivation (Trellová & Hlebová, 2020), prompting the desired behavior, systematically fading prompts, and differentially reinforcing the correct and independent response. Because the participant communicated using signs, the prompting procedure consisted of using imitative or physical prompts. Meaning that the adult either modeled the sign or physically guided the participant's hand to form the sign.

In *differential reinforcement*, only some responses are reinforced, while others are placed on extinction (Vargas, 2020). The differential reinforcement procedure was implemented alongside prompting and prompt-fading procedures. The more independent responses were reinforced to a greater extent than those elicited through adult prompting. For example, when teaching mands (requests), a participant received a larger amount of preferred items when emitting the mand independently than when requiring adult assistance. During intensive teaching, correct responses received stronger reinforcement than those prompted by an adult. The type of reinforcement varied depending on the specific task and activity. In natural environment teaching, the reinforcement for desired behavior was simply the continuation of the activity. For example, if a participant answered correctly by naming the item in response to the question "What is it?", he received the item and continued with the activity. In contrast, during intensive teaching, more external forms of reinforcement were utilized, such as short videos, snacks, or, later on, a token economy system.

A *prompt* is a cue that helps a learner respond correctly (Alberto & Troutman, 2006). However, prompts should be faded out quickly to prevent the child from becoming prompt-dependent, that is, they respond only when a prompt is provided. During the intervention, prompts were used to teach a new skill or to correct an incorrect response. The type of prompt depended on the taught skill (Mikurčíková & Trellová, 2021). The prompt was delivered together with, or immediately after, the instruction. The adult used the prompt level that consistently evoked the correct response. For example, when teaching the receptive identification of an object, the adult pointed directly to the item while giving the instruction, "Give me a (item)." Once the participant responded correctly, the adult gradually faded the prompt by pointing to the item from a greater distance and eventually stopped providing any prompts after the instruction, allowing the participant to answer independently.

Intensive teaching (ITT) is a structured teaching approach typically conducted in a one-on-one format, with one adult working directly with one child. This method is effective for teaching skills identified in the natural environment that are absent. In intensive teaching, individual skills are broken down into small, manageable steps and taught in isolation until mastery (Vargas, 2020). The process involves repeated presentation of instructions, the use of prompts, and reinforcement. This form of teaching has proven to be effective for a variety of skills, including academic skills,

imitation, and self-help skills. Many studies (Lovaas, 1987; McEachin et al., 1993; Smith, 2001 in Simpson, 2005) support the positive outcomes of using intensive teaching methods for children with special needs.

Intensive teaching was implemented during each session. Each teaching segment was brief, lasting about three minutes, and was repeated three to four times per session. Instructions were delivered in quick succession, ensuring that approximately 30 instructional trials were completed within a single segment. For each teaching segment, target skills were selected from one domain identified in the IEP and were interspersed with mastered skills at a ratio of 20 % target skills to 80 % mastered skills. The adult implemented an errorless learning procedure, providing an immediate prompt following the instruction and gradually fading this prompt to promote independent responding. The reinforcement schedule was a variable ratio 2 (VR2) schedule, in which correct responses were reinforced on average every second response.

The errorless learning method is used to minimize mistakes, increase learning rates, and reduce problem behavior (Vargas, 2020). It incorporates immediate prompts to guide the child, ensuring they succeed on each task. Within teaching sessions, errorless learning involved a prompting and prompt-fading procedure for target skills. The adult provided the level of assistance necessary to ensure a correct response to the instruction. On the following trial, the level of prompt was systematically faded out to ensure that the participant answered correctly and independently.

During *natural environment teaching* (NET), the learning opportunities were integrated into the participant's natural daily routines and play activities. This strategy promotes the generalization of skills across various contexts and situations (Sundberg & Partington, 2013). More than half of the session was devoted to NET-based instructions. This included the adult letting the participant select activities and then gradually embedding teaching opportunities within them. For example, if the target skill involved labeling objects, the adult prompted the participant to label items he was engaging with, such as tacting a car, identifying the color red, or naming various animals in the book.

Interobserver agreement (IOA) and Procedural fidelity

Formal IOA and quantitative procedural fidelity were not systematically recorded beyond supervisory observations and video reviews. Fidelity measurement, therefore, cannot be estimated. This limitation is acknowledged in the Discussion and Limitations section.

Results

The participant demonstrated consistent progress across all targeted domains, including visual discrimination, imitation, receptive understanding, tact, and social communication abilities. As shown in Figure 2, the participant progressed from displaying no targets at baseline (03/2023) to acquiring several hundred learning targets by the final assessment (09/2025). His visual discrimination skills improved without direct teaching simply by increasing motivation and improving instructional control.

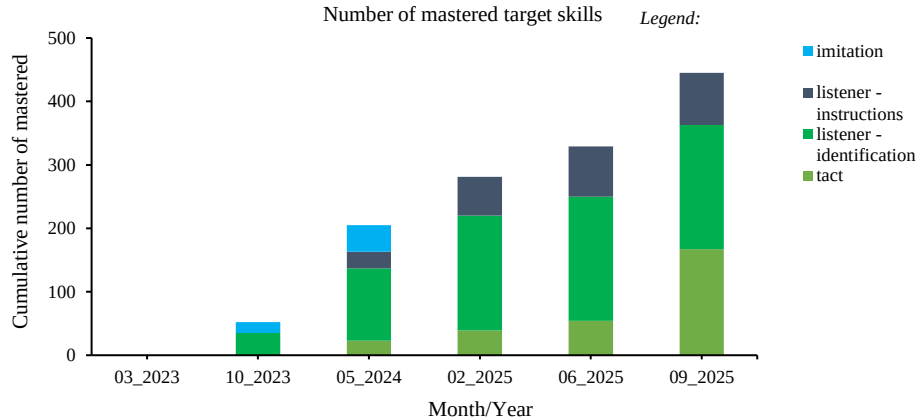


Figure 2. Cumulative number of mastered targets by domain over time (Mar 2023 – Sep 2025)
Note: Mastery reflects correct response across three consecutive days during the probe trial.

The ability to tact items increased steadily, culminating in the mastery of 167 tacts by 09/2025 (Table 2). Receptive identification shows the highest rate of growth, with 196 mastered targets, and continues to acquire new targets in the absence of direct instructions. The listener responding to instructions progressed from following single-step commands to reliably completing two-step instructions across contexts. Similarly, imitation skills generalized to novel targets (05/2024), with no need for additional teaching. Importantly, communication shifted from the use of signs to vocal-verbal responding (speech). A key outcome of the intervention is the participant's ability to generalize newly acquired skills across settings, people, and activities. Learned skills are used not only with the instructors at the center but also with parents and peers. The participant also demonstrates successful participation in group instructional activities. Generalization across verbal operants has also been observed. Newly learned vocabulary is used for both labeling (tacting) and responding to questions (intraverbals) without direct teaching. The participant began to answer simple questions, such as animal sounds, and to answer questions based on function, and to identify objects by their function and category.

Table 2. Number of acquired individual targets

	tact	listener - identification	listener - instructions	imitation
03_2023	0	0	0	0
10_2023	0	35	0	17
05_2024	23	114	26	42 (mastered novel)
02_2025	39	181	61	
06_2025	54	196	79	
09_2025	167	196	82	

Note: Values represent cumulative mastered targets per domain at each timepoint

Alongside progress in the language domain, the participant shows improvements in social communication and adaptive behavior. Increased ability to wait, take turns, and interact with peers contributed to more effective interactions with peers at the center. The current educational goals aim to improve social communication skills, promote independence in preschool routines, and develop flexibility and self-regulation. Additionally, there is a specific focus on reducing rigidity

and problem behaviors that stem from a need for sameness. These goals were selected to support successful participation in the school environment.

Discussion

Children with special needs who have undergone early behavioral intervention show significant improvement in communication skills and adaptive behaviors (Cohen et al., 2006; Healy et al., 2008). The systematic approach based on applied behavior analysis (ABA) focuses on skill development and generalization across different environments. However, effective implementation of ABA methods requires collaboration between teachers, behavior analysts, and parents.

The presented study presents the basic principles of ABA and their application in an educational context. It presents a single case study of a child with autism who underwent behavioral intervention. The results show a substantial improvement in pre-academic skills and the social-communication domain. These results are consistent with previous studies showing that early behavioral intervention leads to significant gains in language, learning readiness, and adaptive skills in children with special needs (Sundberg & Partington, 1998; McKinnon et al., 2024). The participant's improvement suggests that the methods employed were effective in acquiring and maintaining new skills. The most notable finding of the study was the participant's ability to generalize skills across materials, people, and settings. Generalization is often impaired in children with special needs, particularly those with autism, and is therefore considered fundamental to meaningful learning (Stokes & Bear, 1977). The generalization observed in this study, especially across verbal operants (e.g., the ability to use newly learned vocabulary as a tact and answering intraverbal questions), points to the participant's ability to acquire and use functional communication, not just rote responding. The participant showed improvement not only in the target areas but also in social behaviors such as waiting, turn-taking, and interacting with peers, which further supports the claim that behavioral interventions contribute to broader developmental progress rather than isolated skill gains.

The participant acquired new skills gradually. After learning a basic repertoire, especially in the areas of receptive understanding, imitation, and early language skills, advanced skills progressed more rapidly. This process is consistent with the developmental-behavioral model, which supports the cumulative and generative nature of language development (Sundberg, 2014).

The main goal of ABA-based interventions is to promote skills that enable the student to benefit from naturally occurring learning opportunities, rather than focusing on teaching each response in a highly structured environment. The intervention focuses on establishing prerequisites for learning and socialization, i.e., behaviors such as observing, listening, imitating, following instructions, and discriminating between stimuli, which help students to be more successful in any educational setting. Instructions start from simple to much more complex. Socialization skills include mutual exchanges, functional play, peer interaction, problem-solving, community skills, and school readiness (Saigh, 2022). ABA has its place in inclusive education. ABA-based interventions can complement inclusive strategies by helping students to learn foundational participation skills. It does not replace inclusive education; however, it can serve as a preparatory bridge that enables children benefit from inclusive settings with greater independence.

ABA structures individualized activities and promotes socialization during group activities (Musarrat, 2025). With support from ABA professionals, such as behavior analysts, teachers can effectively implement ABA-based methods to improve engagement and learning in their

classrooms. A study by Saigh (2022) examined how to integrate ABA into schools. It found that ABA interventions are tailored to individual needs and support the development of skills that are essential in inclusive education. At the same time, peer interventions naturally promote generalization and reinforce communication skills.

Although the intervention was center-based, several of its components can be adapted to mainstream classrooms with appropriate support. Practical adaptations may involve using simplified behavioral strategies and basic data collection routines that can be incorporated into everyday instruction without placing excessive demands on educators. Successful use of these methods, however, still depends on some guidance from an ABA professional and administrative support to ensure consistent implementation. These considerations emphasize that, while the approach is feasible, its effectiveness with general education setting remains to be empirically validated.

ABA in inclusive education offers many advantages, but it also presents several challenges. Many educators have limited or no knowledge and practical experience in implementing ABA methods. Investing in further training can therefore significantly help teachers and other professionals acquire the critical skills needed to effectively apply ABA principles in the school environment (Johnson et al., 2021; Petersson-Bloom et al., 2023; Aloovi, 2025). A study by Saigh (2022) emphasizes the need for collaboration with an ABA professional. Training and practical workshops will provide teachers with basic knowledge of ABA, but a more comprehensive understanding of behavior requires the skills of a behavior analyst. Including a behavior analyst on the support team can significantly improve the quality and effectiveness of ABA principles and methods in the classroom.

Although some schools do not formally recognize ABA-based interventions, advocating for this approach can help gain access to training and resources. Even integrating ABA strategies into the UDL (Universal Design for Learning) framework can further strengthen this advocacy. In this way, ABA is not positioned as a standalone approach, but as a set of evidence-based methods that complement UDL. By integrating ABA methods such as systematic prompting, reinforcement, and task analysis into education design in accordance with UDL, teachers can more effectively address the diverse academic and behavioral needs of their students. This enhances the practical effectiveness of inclusive education (Musarrat, 2025). Perhaps the most significant barrier to implementing ABA in inclusive education is the outdated perception of ABA, which is based on misinterpretations of early behavioral programs. It is important to note that ABA, as a science, is constantly evolving and includes naturalistic, developmental, and progressive approaches that emphasize motivation, positive reinforcement, and responsiveness to the learner (Leaf et al., 2022). Despite these challenges, integrating ABA principles and methods into inclusive education has the potential to substantially improve educational outcomes for children with special needs. ABA does not replace education; rather, it complements it by systematically analyzing the underlying causes of unsuccessful learning.

Conclusion

Applied behavior analysis (ABA) provides evidence-based procedures that can support learners with diverse developmental profiles (Lovaas, 1987; Simpson, 2005; Axelrod et al., 2012; Healy & Lydon, 2013). Its understanding of behavior and learning helps develop fundamental skills, including communication, social interaction, adaptive skills, academic readiness, and the ability to learn. All of this contributes to effective participation in inclusive education (Saigh, 2022). The

results of the presented study show that, despite the limited number of intervention hours, the participant progressed not only in the target areas but also in adaptive behaviors, such as waiting and working in a group. In developing an individualized educational plan, ABA allows systematic analysis of behavior and the identification of prerequisite skills necessary for acquiring more complex abilities. It is essential to note that ABA is not a rigid approach; instead, it emphasizes flexibility and adaptation to students' individual needs (Leaf et al., 2022). In inclusive education, ABA can complement Universal Design for Learning (UDL) by offering practical methods for acquiring new skills, addressing behavioral challenges, enhancing engagement, and facilitating generalization. The integration of ABA principles and methods into UDL-based lessons allows teachers to create a classroom environment that supports the needs of all students (Musarrat, 2025).

Limitations of the study

The most significant limitation was the relatively low frequency of direct intervention (up to 6 hours per week). It can be hypothesized that a higher rate of skill acquisition would have been observed with more hours of intensive behavioral intervention. Prior research indicates that children who receive more hours of ABA intervention tend to show better outcomes than those who receive fewer hours of intensive intervention (Lovaas, 1987; Healy et al., 2008; Klintwall & Eikeseth, 2014). Another limitation was the lack of ongoing, systematic supervision during the implementation of ABA-based methods. Even though the adult working with the participant was trained and had several years of ABA experience, regular in-person supervision can improve procedural fidelity and improve intervention outcomes (Detrich, 1999; Max & Lambright, 2021). In addition, the absence of formal IOA and procedural fidelity reduces confidence in the measurement precision and treatment integrity. Future implementations will incorporate IOA sampling and routine fidelity audits to address this limitation. Finally, although the intervention was effective for this participant, further systematic replication with a larger sample is necessary to strengthen the generalizability of the findings.

References

- [1] Alberto, P. A., & Troutman, A. C. (2006). *Applied Behavior Analysis for Teachers*. Upper Saddle River, NJ: Pearson Education.
- [2] Aloovi, O. A. (2025). The Impact of Professional Teacher Training On the Learning Outcomes of Autistic Learners in Special Education Settings. *Social Science and Humanities Journal*. 9. pp. 7225-7236. 10.18535/sshj.v9i03.1710.
- [3] Axelrod, S., McElrath, K. K., & Wine, B. (2012). Applied behavior analysis: autism and beyond. *Behavioral Interventions*. 27(1), pp. 1-15.
- [4] Carbone, V. J., Morgenstern, B., Zecchin-Tirri, G., Kolberg, L. (2007). The role of the reflexive conditioned motivating operation (CMO-R) during discrete trial instruction of children with autism. *Journal of Early and Intensive Behavior Intervention*. 4(4), pp. 658-680.
- [5] Cohen, H., Amerine-Dickens, M., & Smith, T. (2006). Early and intensive behavioral treatment: Replication of the UCLA model in a community setting. *Journal of Developmental and Behavioral Pediatrics*. 27(2), pp 145-155.
- [6] Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis*. Upper Saddle River, NJ: Pearson Education.
- [7] Corsello, CH. M. (2005). Early intervention in autism. *Infants & Young Children*. 18(2), pp. 74-85.
- [8] Detrich, R. (1999). Increasing Treatment Fidelity by Matching Interventions to Contextual Variables within the Educational Setting. *School Psychology Review*. 28. pp. 608-620. 10.1080/02796015.1999.12085988.
- [9] Healy, O., & Lydon, S. (2013). Early intensive behavioural intervention in autism spectrum disorders. *Recent Advances in Autism Spectrum Disorders*. 1.

- [10] Healy, O., O'Connor, J., Leader, G., & Kenny, N. (2008). Three years of intensive applied behavior analysis: A case study. *Journal of Early Intensive Behavior Intervention*, 5(1), pp. 4-22.
- [11] Johnson, A., Soares, L., & Gutierrez de Blume, A. (2021). Professional Development for Working with Students with Autism Spectrum Disorders and Teacher Self-Efficacy. *Georgia Educational Researcher*. 18. pp. 1-27. 10.20429/ger.2021.180101.
- [12] Klintwall, L., Eikeseth, S. (2014). Early and Intensive Behavioral Intervention (EIBI) in Autism. In: V. B. Patel, V. R. Preedy, & C. R. Martin (Eds.), *Comprehensive Guide to Autism*. New York: Springer Science+Business, pp. 117-137.
- [13] Kubranská, A., & Šoltýsová, M. (2022). Diagnostika porúch autistického spektra. In D. Ostatníková a kol., *Autizmus od A po S* (s. 90–119). Ikar.
- [14] Leaf, J., Cihon, J., Leaf, R., McEachin, J., Liu, N., Russell, N., Unumb, L., Shapiro, S., & Khosrowshahi, D. (2022). Concerns About ABA-Based Intervention: An Evaluation and Recommendations. *Journal of Autism and Developmental Disorders*. 52. 10.1007/s10803-021-05137-y.
- [15] Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology*. 55(1), pp. 3-9.
- [16] Max, C., & Lambright, N. (2021). Board certified behavior analysts and school fidelity of Applied Behavior Analysis services: qualitative findings. *International Journal of Developmental Disability*, 68(6), pp. 913-923. doi: 10.1080/20473869.2021.1926854. PMID: 36568611; PMCID: PMC9788712.
- [17] McEachin, J. J., Smith, T., & Lovaas, O. I. (1993). Long-term outcome for children with autism who received early intensive behavioral treatment. *American Journal on Mental Retardation*, 97(4), pp. 359–372.
- [18] McKinnon, K., Cihon, J. H., & McEachin, J. (2024). A programmatic description of an early, intensive behavioral intervention program in Australia. *Behavioral Interventions*, 39(4), e2060. <https://doi.org/10.1002/bin.2060>.
- [19] Mikurčíková, L., Trellová, I. (2021). Metóda promptovania v edukácii žiakov so špeciálnymi výchovno-vzdelávacími potrebami. In: Harčariková, T., Lopúchová, J., Mikurčíková, L. (eds). *Špeciálna pedagogika a reflexia inkluzívnych vzdelávacích trendov: zborník vedeckých príspevkov*. Brno: MSD. pp. 139 – 148.
- [20] Musarrat, R. (2025). Integrating Applied Behavior Analysis (ABA) into Mainstream Classrooms for Inclusive Education. Available at SSRN: <https://ssrn.com/abstract=5604752> or <http://dx.doi.org/10.2139/ssrn.5604752>.
- [21] Petersson- Bloom, L., Leifler, E., & Holmqvist, M. (2023). The Use of Professional Development to Enhance Education of Students with Autism: A Systematic Review. *Education Sciences*. 13. 10.3390/educsci13090966.
- [22] Saigh, B. H. (2022). Possibility of inclusive adaptation of the ABA intervention at school. *International Journal of Computer Science and Network Security*. 22(4), pp. 83-88.
- [23] Simpson, R. L. (2005). *Autism Spectrum Disorders. Interventions and Treatments for Children and Youth*. Thousand Oaks, CA: Corwin Press. ISBN 978-1-4129-0603-6.
- [24] Skinner, B. F. (2015). *Verbal Behavior*. Mansfield Centre, CT: Martino Publishing.
- [25] Stahmer, A. C., Reed, S., Lee, E., Reisinger, E. M., Connell, J. E., & Mandell, D. S. (2015). Training Teachers to use Evidence-Based Practices for Autism: Examining Procedural Implementation fidelity. *Psychol Sch.*, 52(2), pp. 181-195. doi: 10.1002/pits.21815. PMID: 25593374; PMCID: PMC4290214.
- [26] Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis*. 10(2), pp. 349-367.
- [27] Sundberg, M. L. (2014). *VB-MAPP. Verbal Behavior Milestones Assessment and Placement Program (2nd)*. AVB Press.
- [28] Sundberg M. L., & Partington J. W. (2013). *Teaching language to children with autism or other developmental disabilities*. Pleasant Hill, CA: Behavior Analysts, Inc.
- [29] Trellová, I., & Hlebová, B. (2020). Učenie mandov u detí s poruchami autistického spektra a inými vývinovými poruchami. *Štúdie zo špeciálnej pedagogiky*. 9(1), pp. 65-75.
- [30] Vargas, J. S. (2020). *Behavior Analysis for Effective Teaching*. New York, NY: Routledge.
- [31] Waters, Ch. F., Dickens, M. A., Thurston, S. W., Lu, X., & Smith, T. (2018). Sustainability of early intensive behavioral intervention for children with autism spectrum disorder in a community setting. *Behavior Modification*, pp. 1 – 24.