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Enhancement of Communication Abilities in Learners with Autistic Spectrum Disorder via the use of Nature-Expo Therapy in Buea, Cameroon; stakeholders' perspectives

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Abstract

Communication is a naturally acquired ability, but it is an uphill task for most learners with autistic spectrum disorders. Absence of time in nature fosters deficiency in areas such as language development and communication skills. This study examined the effect of nature expo therapy on the enhancement of communication abilities in pupils 9-11years with autistic spectrum disorders in the Buea municipality, Southwest Region of Cameroon. The study sought to answer the following questions: how would you describe your child's communication abilities before the intervention, what kind of natural environment did you expose your client to and what constituted the therapeutic activities and the duration and how does nature-expo therapy impact the communication ability of children with ASD?The study adopted the descriptive survey with a qualitative paradigm where parents and therapists of children with autistic spectrum disorders were interviewed and given opened ended questionnaire to decipher their opinion on the children's communication abilities. Five Parents and five therapists of five children with ASD of both genders, from the Buea Municipality of the Southwest regions of Cameroon, aged six to eleven years participated in this research. Data collection was done from April till September 2024. It was done simultaneously between parents and therapist to avoid differences in responses in relation to time. Children's communication deficits were established, and interventions given by therapists. The intervention adopted was nature expo therapy. Parents and therapists reported positive changes in verbal non-verbal and pragmatic language ability for all the children with autism who took the intervention. The study recommended the integration of nature-expo therapy and nature-expo teaching into the everyday activities for children with autistic spectrum disorders.

Keywords: Autistic Spectrum Disorders, Communication, Enhancement, Nature-expotherapy, stakeholders, perception.

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Introduction and Background to the Study

Autism Spectrum Disorder (ASD) is a multifaceted neurodevelopmental condition characterized by impairments in communication and the manifestation of repetitive behaviors and limited areas of focus. The impact of this phenomenon spans across individuals on a global scale; consequently, a comprehensive understanding of its fundamental mechanisms and the accompanying obstacles it presents has become imperative. Recently, there has been a noticeable increase in the occurrence of Autism Spectrum Disorder (ASD) in Cameroon, as well as in other regions across the globe. This upward trend has sparked the interest of researchers, clinicians, and policymakers, who are diligently investigating different facets of this disorder to devise interventions and establish support systems that are both efficacious and comprehensive, catering to the needs of the individuals and their families (Khasawneh, 2023). Communication in humans usually takes an upward trend; however, this is not the case for everyone, especially children with ASD.

Communication is a multifaceted process fundamental to human interaction and experience, enabling individuals to share information, express emotions, and build relationships. It can be defined as the transmission of information through various channels. Shannon and Weaver's (1949) model of communication includes sender, message, channel, receiver, and feedback, which serves as a foundational framework for communication. The model highlights the linear nature of communication, though contemporary interpretations recognize its interactive and dynamic qualities. Communication has various types, which are:

- **Verbal communication**: Encompasses both oral and written forms. Oral communication involves face-to-face conversations, phone calls, and public speaking, while written communication includes emails, reports, and social media. Research indicates that tone and context significantly influence message interpretation (Burgoon et al., 2016).
- **Non-verbal communication**: Involves cues such as body language, facial expressions, and gestures, which play a critical role in conveying meaning. Mehrabian's (1971) research suggests that up to 93% of communication can be non-verbal, emphasizing its importance in interpersonal interactions.
- **Visual communication**: Involves visual elements including images, diagrams, and videos that enhance understanding and retention. Studies indicate that visual aids can improve learning outcomes by facilitating cognitive processing (Mayer, 2001).

An effective communication process involves a dynamic interaction of each of the following elements: sender, message, channel, receiver, and feedback. The role of context, including cultural and situational factors, is particularly significant in shaping communication outcomes for all, whether those with disabilities or not. El-Sayed et al. (2021) hold that barriers to effective communication include physical barriers (such as environmental distractions and technological issues), psychological barriers (including emotional states and biases that can hinder or distort message interpretation), linguistic barriers (which stem from language proficiency to jargon, leading to misunderstandings), and cultural barriers (which pertain to

communication norms and values across cultures that can create challenges in intercultural interactions). According to Al-Farsi et al. (2016), improving or enhancing communication skills entails the use of strategies such as:

- **Active listening**, which calls for full engagement with the speaker and providing constructive feedback.
- **Clarity and conciseness**, which means delivering messages in a clear and direct manner.
- **Empathy and emotional intelligence**, which involves understanding others' perspectives to foster a better connection.
- **Awareness of non-verbal cues**, which is the recognition and appropriate response to body language and facial expressions.

Technology has transformed communication practices, offering both opportunities and challenges. While platforms like social media and instant messaging facilitate rapid communication, they also risk misinterpretation due to the lack of non-verbal cues. Additionally, the digital divide highlights disparities in access to communication technologies, affecting social equity (Hoffman et al., 2018). It is also worth noting that cultural considerations shape communication styles, norms, and expectations. Understanding high-context versus low-context communication can improve intercultural interactions. High-context culture relies on implicit communication, while low-context culture prioritizes explicit verbal messages. Thus, communication is a complex and essential aspect of human interaction with significant implications for personal and professional relationships. The complex nature of communication is further complicated for persons with ASD, as their communication abilities vary across individuals, cultures, exposures, and more.

Autism Spectrum Disorders (ASD) encompass a range of developmental conditions characterized by difficulties in social interaction, communication, and repetitive behaviors. Communication deficits are central to the diagnosis of ASD, affecting the ability to express needs, engage socially, and comprehend language. Children with ASD are often self-absorbed and seem to exist in a private world in which they have limited ability to successfully communicate and interact with others. They may have difficulty developing language skills and understanding what others say to them, and often have difficulty communicating nonverbally, such as through hand gestures, eye contact, and facial expressions. However, the ability to communicate and use language depends on their intellectual and social development. Some may not be able to communicate using speech or language, while others may have very limited speaking skills. Still, others may have rich vocabularies and be able to talk about specific subjects in detail. Many have problems with the meaning and rhythm of words and sentences. They may also be unable to understand body language and the meanings of different vocal tones. Taken together, these difficulties affect the ability of children with ASD to interact with others, especially their peers (Brignell, 2016). Below are some patterns of language use and behaviors that are often found in children with ASD.

Repetitive or rigid language: Often, children with ASD who can speak will say things that have no meaning or that do not relate to the conversations they are having with others. For example, a child may count from one to five repeatedly amid a conversation that is not related to numbers. Or a child may continuously repeat words he or she has heard, a condition called echolalia. Immediate echolalia occurs when the child repeats words someone has just said. For example, the child may respond to a question by asking the same question. In delayed echolalia, the child repeats words heard at an earlier time. The child may say, "Do you want something to drink?" whenever he or she asks for a drink. Some children with ASD speak in a high-pitched or sing-song voice or use robot-like speech. Other children may use stock phrases to start a conversation. For example, a child may say, "My name is Tom," even when talking with friends or family. Still others may repeat what they hear on television programs or commercials (Higgins, 2017).

Narrow interests and exceptional abilities: Some children may be able to deliver an in-depth monologue on a topic that holds their interest, even though they may not be able to carry on a two-way conversation about the same topic. Others may have musical talents or an advanced ability to count and do math calculations. Approximately 10% of children with ASD show "savant" skills, or extremely high abilities in specific areas, such as memorization, calendar calculation, music, or math (Schroder, 2015).

Uneven language development: Many children with ASD develop some speech and language skills, but not to a normal level of ability, and their progress is usually uneven. For instance, they may develop a strong vocabulary in a particular area of interest very quickly. Many of them have good memories for information just heard or seen. Some may be able to read words before the age of five but may not comprehend what they have read. They often do not respond to the speech of others and may not respond to their own names. As a result, these children are sometimes mistakenly thought to have a hearing problem (Serret, 2017).

Poor nonverbal conversation skills: Children with ASD are often unable to use gestures such as pointing to an object to give meaning to their speech. They often avoid eye contact, which can make them seem rude, uninterested, or inattentive. Without meaningful gestures or other nonverbal skills to enhance their oral language, many children with ASD become frustrated in their attempts to make their feelings, thoughts, and needs known. They may act out their frustrations through vocal outbursts or other inappropriate behaviors (Stock, 2013).

Communication intervention for children with ASD is essential for helping them reach their full potential. There are many different approaches, but for effective results, it is best to start treatment early during the childhood years (primary school years). It should be tailored to the child's age and interests, addressing both behavior and communication skills, and offering regular reinforcement of positive actions. Most children with ASD respond well to highly structured, specialized programs. An effective treatment program should ensure the engagement of parents and other caregivers, as they can increase a child's chances of improving their speech and language skills. Just as toddlers learn to crawl before they walk, children first develop pre-language skills before they begin to use words. These skills include

using eye contact, gestures, body movements, imitation, and babbling or other vocalizations to communicate. Children who lack these skills may be evaluated and treated by a speech-language pathologist to prevent further developmental delays. For slightly older children with ASD, communication training can foster basic speech and language skills, such as single words and phrases. Advanced training emphasizes how language can serve a purpose, such as learning to hold a conversation with another person, including staying on topic and taking turns speaking (Vernay, 2017; Sweeney, 2016; Zeina, 2015).

Understanding nature as a therapy

The growing urbanization and disconnection from the natural environment have prompted interest in the therapeutic benefits of nature. Nature as therapy is often referred to as ecotherapy, which is the utilization of the natural environment to promote mental, emotional, and physical well-being. This concept is rooted in the idea that interaction with nature can lead to various benefits, ranging from health and psychological improvements to enhanced communication across lifespans. Components within nature that provide therapeutic benefits can be classified into four categories: domestic nature (indoor plants, companion animals), nearby nature (parks, gardens, urban greenery), managed nature (forests, zoos, fisheries), and wild nature, including remote areas (e.g., the open ocean).

Nature holds significant promise as a therapeutic modality for enhancing holistic development in humans, specifically in children with autistic tendencies. Sandra Hofferth, in her study conducted from 1997–2003, reported a 50% decline in hyperreactivity among autistic children aged nine to twelve who spent time in outdoor activities such as hiking, walking, fishing, beach play, and gardening. Nature has the potential to calm hyperactive autistic children while regularizing and increasing engagement capacity for hypoactive autistic children. It builds their observation capacity and fosters communication (Hofferth, 2003). The sensory-rich, dynamic nature of these settings may facilitate engagement and motivation, reducing barriers typically encountered in clinical and other therapeutic environments.

Studies have proven that nature-based interventions can improve various aspects of communication in children with ASD. For instance, a study by Faber, Taylor, and Kuo (2009) demonstrated that time spent in green spaces promotes social interaction and communication among children. Becker et al. (2017) also noted an increase in verbal and peer engagement for ASD children after weeks of outdoor activities.

Simple interactions with nature can bring both immediate and long-range therapeutic benefits to children with ASD. Natural settings promote restorative experiences that enhance cognitive functions and emotional well-being. Children with autistic tendencies often experience heightened levels of anxiety and sensory overload; thus, exposure to and interaction with nature can serve as a catalyst for social engagement, emotional regulation, and the development of verbal and nonverbal communication abilities. The natural environment is dynamic, inherently complex, and close to other creatures, providing mental

and sensory stimulation through diverse activities, exploration, divergent thinking, imagination, and creativity (Pellegrini, 2005; Faber Taylor, Kuo, & Sullivan, 2001).

Green spaces are known for fostering the development of imaginative play abilities, such as running, climbing, creative symbolic drama, role-playing, and constructive abilities, such as building huts and objects. This has been empirically supported by studies conducted on school grounds, residential courtyards, and childcare centers, where children's behavior was observed in settings with varying levels of vegetation or before and after a site was redesigned to include more greenery (Cloward Drown & Christensen, 2014; Kuh, Ponte, & Chau, 2013; Luchs & Fikus, 2013).

Nedovic and Morrissey (2013) stated that the modern anthropocentric lifestyle, along with the design of institutions, urban/suburban areas, and cultural attitudes, unconsciously associates nature with doom and discourages outdoor activities. This disconnection blinds and misleads many into disregarding the natural environment. Without a healthy wilderness, thriving and survival become increasingly difficult. There is a pressing need to return to a time when the natural environment was appreciated and protected, and children had ample opportunities to explore it.

This study can be tied to Ulrich's (1983/1991) **Stress Recovery Theory (SRT)**, which holds that certain environmental features and patterns—such as vegetation, water, spatial cues, smooth textures, and the absence of threats—elicit rapid affective reactions without conscious processing. The theory emphasizes the restorative effects of natural environments on stress and cognitive functions, including communication. Lower stress levels can enhance comfort and confidence in social situations, facilitating better communication. When individuals are relaxed, they are more likely to engage in meaningful conversations and social interactions.

The theory further suggests that reduced anxiety improves attention to social cues and verbal exchanges, which are essential for effective communication. Nature exposure restores cognitive resources, leading to improved memory and attention. This helps individuals better process information during interactions, making it easier to understand and respond to others. Restored cognitive functions make it easier to articulate thoughts and feelings, enhancing verbal communication.

Nature often evokes positive emotions, which can lead to more constructive social interactions. Positive emotional states are linked to more effective communication and relational engagement. Additionally, nature provides a calming environment for people prone to emotional dysregulation, allowing them time to manage feelings of overwhelm, resulting in clearer communication. Nature-based activities often foster teamwork and cooperation, essential for developing social communication skills. Engaging with peers in a natural context can enhance the desire to communicate and collaborate.

Children with ASD, who often struggle with inattentiveness and emotional regulation, may benefit from exposure to nature, as it can restore attentional capacity and provide opportunities for enhanced cognitive and behavioral performance.

Statement of the Problem

The absence of time spent in nature leads to a deficiency in cognitive abilities, limiting the development of language and collaborative skills, especially in children with ASD. Additionally, children's imaginative abilities, attention, and sense of wonder—critical for lifelong learning, health, and lifestyle—diminish without interaction with nature. Isolation and a lack of interpersonal and intrapersonal skills are common in children with ASD due to their inexperience with natural environments.

Children with autism often exhibit problems with verbal and nonverbal communication, which are attributed to difficulties in information processing and behavior. Their brains may react differently to sensory input, failing to integrate or organize new information appropriately. Research suggests that stimulating the environment, rather than altering processes, is most effective in addressing communication difficulties. Insufficient time in nature significantly impacts stress levels, communication development, cognitive functions, and emotional regulation in children with ASD. This study aims to establish the link between a natural, multisensory stimulating environment and the development of sensory integrative abilities in children with ASD.

Methodology

This study was approved by the Ethics Committee for Research Involving Human Beings of the Faculty of Health Sciences at the University of Buea. This descriptive qualitative study interviewed parents and therapists of children with Autism Spectrum Disorder (ASD) in the Buea municipality to decipher their opinions on the children’s communication abilities. Participants were informed about the objectives of the research and asked to sign an Informed Consent (IC) form, which was duly signed. The confidentiality of the participants' identities was maintained.

Data collection was conducted at the Special Education Diagnostic Laboratory in the UNESCO Building at the University of Buea, Cameroon. Parents and therapists of five children with ASD, aged between six and eleven years, participated in the study. The children were of both genders, and their impairments ranged from mild to severe. The five therapists had known the children for at least twelve months. Three therapists held master’s degrees in special education, and two were pursuing PhDs in the same field at the University of Buea. Five parents or guardians also participated, responding to items in the interview guide.

Interviews with parents were conducted individually in the resource room at the UNESCO Building during the diagnostic and intervention evaluation sessions. Each interview lasted

approximately 30 minutes. Therapists were given an open-ended questionnaire about the children they worked with and answered individually.

Data collection occurred between April and September 2024. Therapists took the children to various natural environments and engaged them in specific therapeutic activities during the intervention process.

Table 1: How would you describe your child's communication abilities before the intervention?

Interview results Statements/quotations	**Themes on Verbal communication**	**Themes on Nonverbal communication**	**Themes on Pragmatics communication**
"Communication generally is problem to my child. Sometimes she will pull your dress and point to what she wants. Sometimes she will repeat the words she heard from someone repeatedly." "my boy has a challenge regulating his volume, he is sometimes too loud and sometimes too low, when he speaks and we don't understand he will cry and hit himself. In any conversations he cannot wait for his turn he interrupts anyone" "Sometimes my client prefers to use gestures, but when the gestures are reciprocated, he does not understand. When speaking to him in hypothetical, proverbs, sarcasm, idioms he does not understand." "Sometimes I feel like my client has something to say but cannot find the words to express himself, he prefers routines new ideas and activities scare him:	Very limited words, one word sentence. Repeat words or phrases, Speak in monotone voice, Difficulties regulating volumes, limited vocabulary, rigid responses,	Inconsistent use of gestures and facial expressions, Difficulties responding to cues, Does not understand body language and facial expressions, avoids eye contact, reduced gesturing, misinterpretation of emotions, self stimulatory behaviour, fixations on objects, engage in repetitive actions with toys or other items.	Struggles with social reciprocity, Does not understand abstract or figurative language, difficulties initiating conversation, Engages in long monologue, Does not understand time, feelings, or hypothetical situations interrupts others cannot wait for their turn, overly direct, difficult interacting with authority figures.

Table one presents parents' and therapists' opinions on the nature of communication abilities of children and clients with autistic spectrum disorders. They reported that, in terms of verbal communication, the children exhibited the following: very limited words, one-word sentences, repeated words or phrases, speaking in a monotone voice, difficulties regulating volumes, limited vocabulary, and rigid responses. Thus, it could be said that the participants had disorders with their verbal communication abilities, as some demonstrated immediate echolalia, delayed echolalia, spoke in a monotone voice with great difficulties regulating volumes, or used unusual intonations or rhythms while speaking.

They also reported challenges with non-verbal communication abilities, such as inconsistent use of gestures and facial expressions, difficulties responding to cues, inability to understand body language and facial expressions, avoidance of eye contact, reduced gesturing, misinterpretation of emotions, self-stimulatory behavior, fixations on objects, engagement in repetitive actions with toys or other items, unusual body gestures, limited use of body language, and more. It is obvious that children with autistic spectrum disorders demonstrate difficulties in understanding body language, facial expressions, and tone of voice, which are often used to convey emotions or diverse social contexts.

From the pragmatic stance, the children struggle with social reciprocity. They do not understand abstract or figurative language, time, feelings, or hypothetical situations. They also find it difficult to initiate conversations; as such, they easily engage in long monologues. They do not understand turn-taking in conversations; as such, they interrupt others. Sometimes, they are overly direct in conversations and have difficulty interacting with authority figures. These children find it difficult to understand the social use of language, misread social cues, lack shared attention, and demonstrate limited engagement in social play. They demonstrate limitations in initiating conversations and tend to focus on what is of special interest to them. They also find it difficult to switch topics in conversations, interpret language literally, misunderstand jokes or humor, and are either too formal or too informal in their communication. They lack politeness, face challenges with emotional expressions and body language, and demonstrate a lack of empathy in conversations, as well as difficulty understanding others' perspectives, such as different thoughts, feelings, or knowledge about social situations.

It could be concluded that parents and therapists identified vast communication challenges in children with autistic spectrum disorders.

Table 2: What kind of natural environment did you expose the children to and what constituted the therapeutic activities and the duration?

Interview results Statements/quotations	Natural environment	Therapeutic activities
"We went to the following places: in Limbe we visited the following places: The Botanic Garden the zoo in Limbe, the beach, play site for children at the entrance to Limbe. Since it was a weekend, we took two days to visit the various sites. we intended to spend four hours each but ended up spending less than two hours in areas where the child was not comfortable."	Horticultural/Garden zone such as the Limbe botanic garden, personally developed garden	**Horticultural therapy:** guided exposure and manipulation with, soil, sand, stones, flowers, trees, vegetables
	Animal /Bird zone	**Pet therapy:** guided exposure and

"I also realise that taking my child to the pool for swimming made him quite excited and from that time she started talking and playing with other children in the compound and in school, I think exposing her to what she likes makes her to be able to play and relate freely with others." In school, as I teacher I do most often present pictures of some natural sites we can't go to so they have a feel of them such as mountains		manipulation of various animals and birds such as cats, dogs, parrots, and more
	Water/Aquatic zone	**Aquatic therapy:** guided exposure and manipulation with water such as being in the pool, or staying in the bathtub and playing with other sea creatures

Table 2 above shows a categorization of the natural environment children with autism were exposed to. It constituted horticultural/garden zones, which involve horticulture therapy, such as in the Limbe Botanic Garden and some home-made gardens where the children with ASD were exposed to play and manipulate soil, sand, stones, flowers, trees, and vegetables. Such interaction leaves the children excited and stimulated.

The next natural environment children with ASD were exposed to was the Animal/Bird zone, which constitutes pet therapy. In this zone, the children were guided and exposed to play with various animals and birds, such as cats, dogs, parrots, and more of their choosing.

Lastly, the children were exposed to the Water/Aquatic zone, where they received aquatic therapy through guided exposure and interaction with water, such as being in a pool or staying in a bathtub and playing with other sea creatures.

Numerous changes were observed in these children after exposure to these various natural environments, which will be discussed below. Children with ASD were exposed to therapies that included horticultural activities, aquatic activities, and activities with pets, and these produced positive results that will be discussed below.

Table 3: Parents perception of the changes on children with ASD communication abilities after the nature expo-therapy intervention.

Statements/Quotations	Emerging themes on verbal communication	Emerging themes on non-verbal communication	Emerging themes on pragmatic communication
Since we started the water expo my son has become calmer and responsive, avoiding confusion and he pronounces word clearly, he can moderate his tone and pitch.	Clarity and articulation, tone and pitch moderation, confidence,		
For my daughter she is rather become more interactive, speaking at moderate speed not too fast with little repetitions, a little increased in her vocabulary,	pacing and timing, increased vocabulary,		

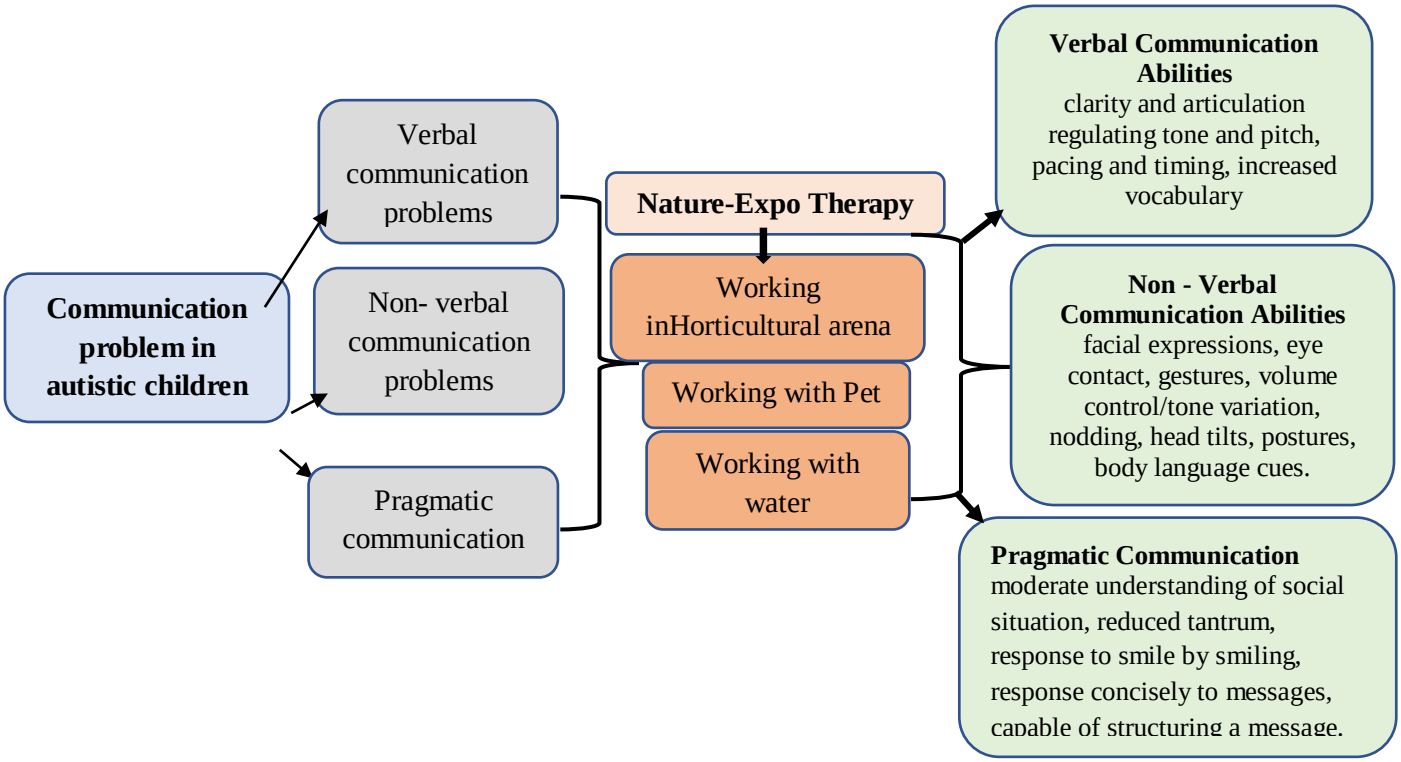
clear message, and more organised in her presentation than before.			
At first my daughter could not convey emotions through facial expressions, she smiles to show friendliness and frowns to express worries, she can maintain eye contact even for just few seconds, she uses hands gestures to communicate. Sometimes she nods her head in approval and tilt her head to indicate curiosity and interest.		Facial expressions, eye contact, gestures, volume control/tone variation, nodding, head tilts, postures, body language cues.	
My daughter can now wait for turn in a conversation, she uses please and thank you when speaking. My client's ability to smile back when smiled at shows she understands social situations. I also realised that the children can answer concisely, and knows when to ask for clarification, reduced throwing of tantrums, they are capable of structuring a message,			Moderate understanding of social situation, reduced tantrum, response to smile by smiling, response concisely to messages, turn taking,

Table 3 highlights the observed changes in the communication abilities of children with Autism Spectrum Disorders who were subjected to nature-expotherapy. Parents indicated that the children made improvements in verbal communication in terms of clarity and articulation, tone and pitch moderation, confidence, pacing and timing, and increased vocabulary.

Parents also observed the following improvements in their children's non-verbal communication abilities: facial expressions, eye contact, gestures, volume control/tone variation, nodding, head tilts, postures, and body language cues.

Pragmatically, the children demonstrated the following improvements: moderate understanding of social situations, reduced tantrums, responding to smiles by smiling, concise responses to messages, and the ability to structure a message.

Fig 2: How Nature enhances communication abilities in children with ASD



The figure above summarises the impact of nature-expo therapy on the communication abilities of children with autistic spectrum disorder. They demonstrated improvement in the verbal, non-verbal and pragmatic communication abilities.

Discussion

Nature-expo therapy, which is also known as ecotherapy or nature-based therapy, refers to therapeutic practices that incorporate exposure to natural environments into the treatment of physical, emotional, and cognitive challenges experienced by humans at various stages of development. It involves integrating natural settings, such as forests, parks, or gardens, into therapeutic practices to promote sensory engagement, reduce stress, and enhance communication skills. Children with autism often face challenges with social communication, including difficulties in understanding non-verbal cues, forming relationships, and engaging in reciprocal communication. Nature, with its rich sensory and social aspects, offers unique benefits that contribute to various developmental areas, including communication. Exposing children with autism to nature has shown promise in enhancing various aspects of their verbal, non-verbal, and pragmatic communication abilities, as reported by parents and therapists in this study.

Gifford and Chen (2016) hold that children with autism, who often experience heightened anxiety and stress in social situations, have sensory sensitivities that can make interactions in crowded, noisy, or overstimulating environments difficult. Nature provides a rich sensory environment, stimulating sight, sound, touch, and smell in a way that is different from the more controlled, artificial environments often used in traditional therapies, resulting in a

reduction in their anxiety levels and consequently improving their ability to articulate, speak clearly, regulate tone and pitch, and experience an increase in vocabulary. Natural environments are typically less overwhelming compared to highly structured or clinical settings, providing a calming and non-judgmental space for children to engage with their surroundings and with others. When children are less overwhelmed, they may be more receptive to communication and social interaction. Therefore, in nature, children are less likely to become overstimulated by loud noises, bright lights, or chaotic environments, which means they may have more energy and focus for communication. This can encourage more meaningful exchanges with adults, peers, and even non-verbal communication through gestures or body language.

Barakat, Bakr, and El-Sayad (2018) hold that activities in natural settings, such as guided exploration or animal care, can promote communication through shared experiences. For example, children may learn to express themselves by identifying animals or plants, making observations, or following directions. This promotes language use in meaningful, real-world contexts. Additionally, nature therapy often uses structured activities like storytelling, role-playing, or collaborative games, which can provide children with opportunities to practice speech and communication in a less structured and more enjoyable setting. Clayton (2012) posits that outdoor settings present opportunities for children to engage in imaginative play, which is an essential component of language development. When children play creatively in nature, they often invent scenarios, role-play, and mimic others, all of which encourage the use of language and foster social communication skills.

Exposure to nature has been shown to improve attention span, which is crucial for communication. Children with autism often struggle with maintaining focus during therapeutic activities, but time in nature can help them reset and refocus, potentially improving their ability to engage in conversations or tasks. Many children with autism struggle with attention regulation, which can affect their ability to focus on conversations or tasks that require verbal communication. Li, Larsen, Yang, Wang, Zhai, & Sullivan (2019) hold that children manifest fewer symptoms and function better after activities in green spaces. Nature-based activities help improve focus, as the natural environment has been shown to promote attention restoration. Being outdoors allows children with autism to take in their surroundings in a more focused way, which, in turn, helps to hone attention to detail and improve cognitive processes related to communication. They were more specific in stating that children with ASD showed milder symptoms of attention deficit and isolation when they played outdoors.

The results show a marked improvement in the manifestation of non-verbal communication abilities in children with autism. Nature-based interventions often involve activities that encourage the use of gestures, body movements, or visual cues. For instance, a child might be encouraged to point at or show a particular flower or bird, which promotes non-verbal communication skills. In the natural environment, children often rely on gesturing and pointing to communicate their needs or desires before they fully develop verbal language, so these forms of communication are emphasized. The results of this study are in line with Sachs

& Tara (2011), who declared that nature-based activities, such as running, climbing, or playing games, often require physical movement, which has been shown to enhance cognitive and social development. Physical activity, particularly when done in a natural environment, stimulates brain functions that are crucial for learning and communication. They further stated that activities like playing in a playground or participating in group games provide chances for children with autism to observe and practice body language, facial expressions, and gestures in a natural setting. These non-verbal communication skills are often underdeveloped in children with autism, so these physical experiences offer opportunities for improvement. They also encourage turn-taking, sharing, and collaboration, which are foundational social skills. Learning to engage in these activities, particularly with peers or family members, can improve the child's ability to communicate and interact with others in structured and unstructured ways.

Barakat, Bakr, and El-Sayad (2018) hold that pragmatic language, often referred to as the social use of language, encompasses the skills necessary for effective communication in everyday social contexts. These skills include understanding non-verbal cues, using appropriate tone and volume, turn-taking, initiating and maintaining conversations, and interpreting figurative language. Nature-expo therapy often takes place in group settings where children with autism interact with peers and therapists. Pragmatic language requires the ability to organize one's thoughts and communicate in a cohesive and engaging manner. Nature provides a rich tapestry of events and experiences to weave into practical narratives, which enhance the ability to sequence, use descriptive language, and incorporate emotional content. These skills directly contribute to improved conversational storytelling, which is a crucial component of pragmatic language development.

Prior to nature-expo therapy, therapists and parents reported a series of inappropriate communicative behaviors, which are also disclosed in the literature as characteristic traits of children with Autism Spectrum Disorders. These include: inappropriate use of eye contact; difficulty reading emotions in facial expressions; difficulties expressing emotions in facial expressions; difficulty understanding communicative and non-verbal gestures; lack of use of communicative and non-verbal gestures; difficulties with conversational repair; absence of prosody (i.e., voice melody); difficulties maintaining topics; exaggerated speech; lack of social initiations with others; difficulties with conversational reciprocity; perseverance in language; difficulties with topic coherence; use of tangential language; difficulties interpreting abstract language; difficulties showing interest in others; difficulties with friendships; restricted and repetitive interests; and impaired pragmatic language, which is the use of language for social interaction.

From the parents' and therapists' perspectives, children with Autism Spectrum Disorders demonstrated positive changes in their verbal, non-verbal, and pragmatic use of language abilities. It is obvious that these changes are not very conspicuous, but they are significant and recognizable. Parents and therapists observed the following changes in the verbal abilities of the children: clarity and articulation, regulating tone and pitch, pacing and timing, increased vocabulary, and more. In terms of non-verbal abilities, the children demonstrated

improvement in facial expressions, eye contact, gestures, volume control/tone variation, nodding, head tilts, postures, body language cues, and, in terms of pragmatic language, they showed an increased moderate understanding of social situations, reduced tantrums, responses to smiles by smiling, concise responses to messages, and the ability to structure a message.

Implications for Education and Practice

Schools and other institutions working with children with Autism Spectrum Disorder should incorporate outdoor time as a regular activity in the daily routine of these children. The children should be given the opportunity to live in nature by providing habitats for animals and places to experience natural resources such as wind, sun, rain, and shade. Provide chances for planting and harvesting. This is because outdoor play can improve their awareness, reasoning, observational skills, social interaction, language, and cooperative skills.

Schools and families could design a place in school or at home to display pictures representing the changing seasons and the constituents of nature, such as bird feeders. Decorating with houseplants and allowing children with autism to spend time in such corners will help calm the nervous system if they become overwhelmed and will enable them to become active participants in their learning process, valuing their thoughts, ideas, and creativity.

To effectively incorporate nature-expo teaching, teachers could adopt Nature-Expo Teaching as a pedagogic strategy for learners with Autism Spectrum Disorders. This teaching strategy uses nature-based experiences and environments to support the sensory, social, and emotional development of individuals with ASD. It leverages the calming, enriching, and stimulating qualities of natural settings to help individuals improve their social skills, communication, and overall well-being. Nature-oriented teaching is characterized by a warm and homelike atmosphere with an emphasis on storytelling, creative play, art, music, and movement.

Conclusion

This study sought to understand the place of nature-expo therapy in enhancing the communication abilities of learners with Autism Spectrum Disorders in the Buea Municipality. Through the exposure of these learners to various natural environments, such as the horticulture zone, pet zone, and water zone, they experienced an increase in their verbal, non-verbal, and pragmatic communication abilities, as attested by parents/caregivers and therapists. It can therefore be concluded that, from the perspectives of parents and therapists, nature-expo therapy significantly improves and enhances the communication abilities of learners with Autism Spectrum Disorder.

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