

Importance of using Bahraini based High – Tech Augmentative and Alternative Communication (AAC) for children with communication difficulties within the region

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ABSTRACT

Depending on the needs of each person, from children to the elderly, the usage of high-tech augmentative and alternative communication devices is constantly increasing. Arabic has been classified into three main versions: Quranic or classical Arabic, Modern Standard Arabic, and Colloquial or Daily Arabic. Arabic is the primary language spoken in the Middle East. Based on their pronunciation, grammar, and vocabulary, these Arabic dialects are used differently in different parts of the Arabian Gulf, including Saudi Arabia, Bahrain, Qatar, Kuwait, Oman, and the United Arab Emirates. Bahrain uses standard Arabic as its primary dialect. Utilizing assistive technology can lessen the need for long-term care, support services, and caregiver labor. Using a Bahraini based high–tech device will be beneficial to those families or caregivers to understand the communication of the children more efficiently. This article focuses on the importance of using a Bahraini-based AAC devices, which is considered a best practice for intervention by including all the needs of a child such as motor, sensory, learning, and communication, as well as their environment, personal preferences, and support structures. A further research is indeed needed for the development of the app, its funding, and the approval to create the AAC device in Bahrain. A total of 76 participants from professional backgrounds answered a questionnaire on their knowledge of AAC and any Bahraini-based AAC apps along with its importance in classrooms or during sessions. These were conducted on weekends for a certain duration of time with both Bahrainis and Non – Bahrainis of various nationalities, ages, and genders. Individuals from different settings such as schools, hospitals, clinics, and centers were interviewed. The majority of the participants used low-tech AAC such as Picture Exchange Communication System (PECS) or high-tech AAC apps that were much more familiar.

Keywords: *Augmentative and Alternative Communication, AAC, Quranic Arabic, Arabian Gulf, assistive technology*

INTRODUCTION

Augmentative and alternative communication (AAC) interventions for children with various developmental disabilities and complex communication needs increase functional communication skills (Drager et al., 2010), increase language and social competence (Light et al., 2003), and can increase natural speech in some individuals (Millar et al., 2006). The ability to effectively and efficiently communicate wants and needs and actively participate in social exchanges can improve quality of life and independence (Chan & Zoellick, 2011). Communication increases social closeness, or relationships between individuals characterized by positive exchanges, mutuality, sharing, and mutual enjoyment (Howes, 1983), (Crowe et al, 2022).

Augmentative and Alternative Communication (AAC)

Augmentative and Alternative Communication, also known as AAC, is a type of communication tool used to provide speech for individuals with no or poor communication and language difficulties. The difficulties can be caused by various reasons such as neurological conditions, trauma, etc (Niagara University First Responders Disability Awareness Training, n.d.).

Children who require the need for AAC:

- When the child is not able to use spoken words by the age of 18 months
- He or she has a medical condition or developmental history that leads to short or long-term communication challenges
- Child is not able to communicate their needs to their family, relatives or peers leading them to frustration and overwhelming
- The child's communication is causing a huge negative impact at school, play groups and other social or community opportunities

There are various primary type

s of AAC such as facial expression, gestures, sign language, pictures, symbols, writing and speech generating devices (SGDs). There are two types of AAC systems:

Unaided communication system – This include non-spoken means of natural communication (including gestures and facial expressions) as well as manual signs and American Sign Language (ASL). These modes of communication often require adequate motor control and communication partners who can interpret the intended messages. Aided communication system – This include those approaches that require some form of external support, such as communication boards with symbols (e.g.,

objects, pictures, photographs, line drawings, visual – graphic symbols, printed words, traditional orthography) or computers, handheld devices, or tablet devices with symbols that generate speech through synthetically produced or recorded natural (digitalized) means (American Speech-Language-Hearing Association, n.d.).

The below table (Table 1) shows the various forms of unaided and aided AAC options to

be considered for an individual with a communication disability. While an AAC option would be sufficient for many children, it is possible that a combination of different systems can be beneficial for some children (Sundberg & Partington, 1998). Most people use a combination of unaided and aided communication techniques, depending on the context and communication partner (Mirenda, 2003), (Nam et al, 2018)

Table 1. Major Unaided and Aided AAC options

	Unaided	Aided
Non – electronic	<ul style="list-style-type: none"> ➤ Manual signs ➤ Low–tech eye gaze ➤ Gestures ➤ Facial expression 	<ul style="list-style-type: none"> ➤ PECS ➤ Writing texts
Electronic	<ul style="list-style-type: none"> ➤ High–tech eye gaze 	<ul style="list-style-type: none"> ➤ SGDs ➤ Typing texts

Note. From “An Overview of Review Studies on Effectiveness of Major AAC systems for Individuals with Developmental Disabilities including Autism” by Sang Nam, Ph.D., BCBA, Jemma Kim, Ph.D., Shannon Sparks, Ph.D., 2018, *Journal of Special Education Apprenticeship*, 7(2), 1–14. <https://files.eric.ed.gov/fulltext/EJ1185374.pdf>

The use of augmentative and alternative communication (AAC) is recommended to ensure that children do not establish patterns of communication failure. AAC includes tools and strategies that an individual with speech and/or language impairments can use to complement or even replace speech or writing. Some examples of AAC are the *Picture Exchange Communication System (PECS)* and *Speech – Generating Devices (SGDs)*.

Some of the commonly used AACs are:

PECS

Originally developed by Bondy and Frost in 1994. It is a picture-based AAC system that uses basic behavioral principles to teach children and use functional communication in a social context. The pictures are used to communicate, in exchange for items or tasks (Bondy & Frost, 1994, 1998). PECS has been reported to be successful in interventions with individuals with ASD, but the intervention was usually focused on teaching and requesting items, and not on

enhancing other aspects of communication. Although PECS is successful, its paper-based nature has some disadvantages, such as preventing educators from tracking the child's progress, and adding social stigma because the child has to carry a book or a folder constantly (Syriopoulou-Delli et al., 2022)

SGDs

SGDs are a high-technology form of aided AAC. They are also referred to as voice-output communication aids (VOCAs). SGDs are used to facilitate both the expressive and receptive communication of children and are popular with teachers and therapists because of the consistency that they provide in terms of the messages produced. These systems implement the use of symbols and pictures that represent words, and most children process and respond to information better when it is in visual form.

SGDs include newer mobile tablets and other handheld devices that produce electronic digitized or synthesized speech. They are easily accessible due to the wide availability of "smart" devices, and they are referred to as non-dedicated SGDs. In recent years, non-dedicated SGDs based on iPads are becoming increasingly popular, because iPads and other tablet devices are used by large numbers of people, including children, which makes them less "stigmatizing" for

the user, unlike the dedicated SGDs used in the past (Syriopoulou-Delli et al, 2022).

The GCC or Gulf Cooperation Council which includes Bahrain, Saudi Arabia, United Arab Emirates, Kuwait, Qatar, and Oman uses Arabic as their main language. Different types of Arabic have been classified into Quranic or classical Arabic, Modern Standard Arabic, and Colloquial or Daily Arabic.

The most commonly used Arabic dialect is the Khaleeji or اللهجة الخليجية, 'the Gulf dialect'. It all depends on pronunciation, grammar, and vocabulary.

Countries that speak the Gulf dialect are the United Arab Emirates, the State of Kuwait, the Kingdom of Saudi Arabia, the Kingdom of Bahrain, and the State of Qatar. The Omani dialect is not considered as a Gulf dialect. Their words and meanings are different. It is an ancient dialect that has been passed down through generations until the present time (Elbadawy, 2020).

Emirati Dialect

The Emirati dialect is a branch of the Arabic language. It is similar to the Kuwaiti dialect in some words. In this dialect, the letter "qāf" (ق) is pronounced "gā" (ج) and the letter "Jim" (جيم) is often pronounced as a "ya" (يا), such as "Masjid = Masyid." (table 2)

Table 2. Emirati dialect words and its English translation

Emirati	English
Aseer – اذهب = اسير	Go
Dresha – نافذه = دريشه	Window
Benaya – بنت = بنيه	Girl
Hogra – غرفة = حجره	Room
Abba – اريد = ابا	Want

Kuwaiti Dialect

The Kuwaiti dialect is a branch of the Arabic language as well and one of the Gulf dialects, but many of its words disappeared and new words appeared with the succession of different generations and the influence of different cultures.

The Kuwaiti dialect is characterized by two main branches: The urban Kuwaiti dialect and the Bedouin Kuwaiti dialect.

The difference between them appears in the pronouncement of the letter “Jim” (جيم) as in the urban dialect, it is pronounced as “ya” (يا), like the word “chicken” (دجاجة), is pronounced as “Diyya” (دياية), and the word “riyal” (رجال) for “rejal” (رجال) which means men. Also, the letter “qāf” (ق) is pronounced in the Kuwaiti dialect as “gā” (جا) (table 3)

Table 3. *Kuwaiti dialect words and Its English translation*

Kuwaiti	English
أبي = اريد - Abi	I want
سكر = أقفل - Sakar	Close
شئو = ماذا - Shnowa	What

Bahraini Dialect

The Bahraini dialect is used by most of the inhabitants of the Kingdom of Bahrain. And it speaks in two different dialects: The **Bahraini** dialect (Baharnah dialect) is the most widespread and is used in most areas of Bahrain. It is a little similar to the Iraqi dialect and the **Gulf** dialect, which is used in [Muharraq](#), [Riffa](#), [Budaiya](#), Madinah, Umm Al Hassam, and some other areas. It is

similar to the Qatari dialect with a difference in pronunciation.

There are many words in the Bahraini dialect that are not originally from the Arabic language, and the origins of these words go back to the Persian, Hindi, and Turkish languages as a result of these nationalities mixing with Baharna for a long time (table 4).

Table 4. *Bahraini dialect words and its English translations*

Bahrani	Origin	English
دوشق = السرير - Doshak	Persian	Bed
سامان = ادوات - Saman	Hindi	Tools
دريشة = النافذه - Dresha	Turkish	Window

Qatari Dialect

The Qatari dialect is also derived from the Arabic language and is similar to the Kuwaiti dialect. “qāf” (ق) is pronounced “gā” (ج) and also in some words the letter “Jim” (جيم) is often pronounced as a “ya” (يا) (table 5)

Table 5. *Qatari dialect words and its English translations*

Qatari	English
مدوّح: مستدير = Madouh	Round
فتاه جميله: دعبوبة = Dahbouba	Beautiful girl

Saudi Dialects

The Kingdom of Saudi Arabia is the original homeland of the Arabic language. The

Arabic dialects vary there according to the following factors: geography, tribal, civilization, and nomadism (table 6).

Table 6. *Saudi dialect words and its English translations*

Saudi	English
جر: اسحب = Gor	Pull
يدبج: يستطدم = Yadbaj	Crash

مرتاع = Morataa : خايف	Afraid
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Omani Dialects

The Omani dialect is different than the Gulf dialect and other Arabic dialects. Its words and their meanings are different. It is a long-standing dialect inherited by generations to the present, and the Omani dialect varies from region to region and sometimes from one state to another. The dialect in the eastern region is different from the other regions such as Al-Batina, Mosandam, Al-Dakhleya, and Zafar.

The Muscat people’s accent is the one that is understood by all. As well as the people of Musandam because they are close to the Persians, they have been influenced by them, there are some Persian words they use in their Arabic speaking, so they are incomprehensible to those who do not understand Farsi. The eastern dialect and Al-Brimi province are also understood by the people of the UAE (table 7).

Table 7. *Omani dialect words and its translation*

Omani	English
لهجه: هرجه = Lahga	Dialect
خروفة:الكلام = Kharoufah	Utterance
تيتون:صغير = Taytoun	Small

Based on these vocabulary, grammar, and pronunciation some of the countries in the Gulf have developed Augmentative and Alternative Communication (AAC) devices for their native speakers.

For example, Qatar has created an AAC app called as “Tawasol”.

The Tawasol AAC app was released in 2013 in which Mada embarked on a project to develop the first AAC symbol set called Tawasol Symbols which is focused towards

the Qatari Arabic language and the Modern Standard Arabic (MSA). The project was launched in collaboration with University of Southampton and Hamad Medical Corporation and funded by Qatar National Research Fund (QNRF). Currently, the

Tawasol Symbol set comprises of over a thousand symbols covering the core language vocabularies which are available in both languages, Arabic and English (Mada Innovation Program, n.d.).

METHOD

Aim of the study

This research aims to identify the importance of using a Bahraini based high-tech AAC device for children with communication needs in various settings. A detailed evaluation has been conducted through

interviews from special schools, hospitals, professionals, and family members of children with communication difficulties in Bahrain.

Participants

There were a total of 76 participants from various settings, mainly working with children with special needs, such as teachers, and co-teachers from special schools. Speech-language pathologists from centers, clinics, and hospitals. The author preferred to use a mix of Bahrainis and Non – Bahrainis such as Indians, Syrians, Pakistanis, Filipinos, and Egyptians. It included both males and females of age groups from 25 to over 40 plus. Most of them had a wider experience in the field of special education within the country. Among these participants majority used Arabic as their mode of communication and less used English. Bahraini parents of children with

communication difficulties. These parents were bilingual and some preferred English over Arabic and the others strictly opted for pure Arabic. Approximately 70% of Bahrainis can only speak Arabic and about 30% of them can speak basic English. All these participants were people that the author knew and within the work settings for smoother access to information and testing rather than finding additional people due to different reasons such as availability, distance, and duration.

The number of participants from each setting were as follows: there were 50 from special schools (these were the number of special educators from the special needs), 8 from hospitals, 3 from clinics and 15 from centres.

Table 8. *The below table shows the participants (professionals) from different settings, their ages and genders who participated*

SL No.	Participants from various settings	Age		Gender	
		Minimum	Maximum	Female	Male
1.	Special Schools – 50	26	45	✓	✓
2.	Hospitals – 8	29	38	✓	✓
3.	Clinics – 3	28	33	✓	-
4.	Centres – 15	28	45	✓	✓
Total	76 participants	Mean age = 34			

The above table (table 8) shows the number of participants (Bahrainis and Non – Bahrainis of different nationalities) from each setting their age groups along with the

Materials

The materials used were questionnaires and a structured set of interview questions with different participants on their knowledge of AAC and Bahraini-based AAC along with its importance. These questionnaires were created by the author and some were taken

from existing sets & administered. The questions to be asked were displayed on the screen and during a team meeting they were answered by each staff from the schools, hospitals, centers, and clinics. The sample questions are given in a tabular column below in Table 9 (Northwest Augmentative Communication Society, n.d.).

Table 9. *Sample questions in the questionnaire*

Questions	Answers
Are you aware of AAC devices and its types?	
Does anyone of them use high-tech AAC devices? If yes, name at least 2	
Comparison of low and high-tech devices of AAC	
How do you feel about the usage of these devices in your schools or classrooms?	

What kind of training have you had in AAC?	
Do you feel it is necessary to use Bahrain-based high-tech AAC devices for children?	

Note. Most of the questions in the questionnaire were created by the author and the rest were modified according to the scenario and the original copyright taken from “Questions to ask when seeking an AAC provider. NWACS. (n.d.-a)”. <https://nwacs.info/questions-to-ask-when-seeking-an-aac-provider#:~:text=AACTraining%20and%20Experience,Light%2Dtech%3F>

Procedure

The procedure was mainly conducted on Fridays and Saturdays (weekends in Bahrain) from morning 9 am to 12 pm. The evaluation was conducted for 4 weeks.

Week 1 – Staff of special schools and parents were given questionnaires. Once they fill up these questionnaires interview were conducted with these groups of teachers/parents. The questions asked were as follows (Northwest Augmentative Communication Society, n.d.),

- Are you aware of AAC devices and its types?
- Does anyone of them use high-tech AAC devices? If yes, name at least 2
- Comparison of low and high-tech devices of AAC
- How do you feel about the usage of these devices in your schools or classrooms?
- Do you feel it is necessary to use Bahrain based high – tech AAC devices for children?

Week 2 – The SLTs from centers were interviewed. They were asked about

the use of high – tech AAC devices in their sessions, most of them used PECS as an AAC device and high – tech devices were limited due to the proper availability of Bahraini-based device. Some did use AAC devices such as “proloquo2Go” or “Let Me Talk”. Some mentioned due to the language barrier and difficulty to use the high-tech AAC by the parents.

Week 3 and Week 4 – The week 3 and 4 were for participants working in hospitals and clinics who were interviewed on the use of AAC devices either in Arabic or English. Few groups did use high-tech devices but most of them used PECS or apps that can help to communicate other than the standard AAC devices used.

On observation from various sources such as different settings, colleagues across the region who work with communication difficulties children and parents of these children mainly use low-tech AAC devices such as PECS or use high – -tech AAC devices such as “proloquo2Go/ LetMeTalk”, or apps that use PECS strategy. There are no

other high-tech AAC devices that have been used in Bahrain in various settings based on

the information that the author has received through the above-mentioned ways.

RESULTS

The results showed that individuals such as SLTs, or other allied health professionals such as OTs and PTs from various centers, clinics, and hospitals were well aware of the AAC devices and their uses. Some of them

even use low-tech AAC devices like PECS board during their sessions and few use High-tech devices which are mainly in English.

AAC Devices	Satisfaction level	Improvement level
PECS	~ 40 individuals found using PECS very satisfactory	Less tantrums and meltdowns. Showed a better performance during the sessions.
AAC apps on iPad (English)	~ 10 persons use different AAC apps that are in English language	Can use a variety of vocabularies to communicate.
AAC apps on iPad (Arabic)	~ 3 to 5 individuals only use AAC app that has Arabic in them	Able to understand by native speakers and could communicate with others who uses Arabic as their mother tongue

These results show the number of individuals who used different types of AAC devices and their satisfactory and improvement levels. Individuals who used PECS (low – tech device) showed that by using this method they were able to incorporate them into their classroom settings and each child was provided with a PECS board within the desk. Approximately 30% of professionals use PECS within their sessions. A drawback of

this item was that this is quite heavy and hard to carry around and proper training is required for both staff and parents other than SLTs on how to use the correct PECS stages to acquire a fully developed communication system. On the other hand, the high-tech AAC devices that are in English and Arabic were uncommon among staff, especially in special schools that use Arabic to communicate. Approximately <10% don't

use any Arabic AAC within their settings due to the poor availability of apps and the cost of getting the app to use. The results acquired are within a very limited resource and information received from the surroundings

An Appropriate AAC intervention can have a positive effect on the functional communication skills of young children with a wide range of disabilities. The improvement of functional communication skills (i.e., communication necessary to participate in a given environment) is a

and some of them can not be fully reliable. However, within the given details further research can be done to have a clearer image and the importance of needing an AAC app that is beneficial for the people of Bahrain.

primary goal of AAC interventions. The goal of building functional communication skills is a priority not only for professionals but also from the perspective of individuals who use AAC. Table 10 summarizes the effects of AAC interventions in each area.

Table 10. *Effects of AAC interventions on areas of development*

Areas of Development	Effects of AAC interventions
Functional communication skills	<ul style="list-style-type: none"> • Can increase functional communication goals: the expression of needs and wants, the development of social closeness, the exchange of information, and the fulfilment of social etiquette expectations. • Has positive effects on the expression of needs and wants by young children with developmental disabilities (e.g., requesting, rejecting, making choices). • Can promote social closeness interactions and information exchange (e.g., play activities, social routines)
Challenging Behaviors	<ul style="list-style-type: none"> • Functional communication training (FCT) can reduce the challenging behaviors demonstrated by young children • Visual schedules can be used to reduce challenging behaviors associated with a lack of

	<p>understanding and anticipating daily schedules and routines.</p>
Expressive Language Skills	<ul style="list-style-type: none"> • Can have a positive effect on the language skills of young children with complex communication needs, including: <ul style="list-style-type: none"> ❖ Pragmatic language (social uses of communication, such as turn taking), ❖ Semantic meanings (the meanings of words and sentences, such as vocabulary acquisition), ❖ Syntactic language/morphological markers (the order and combination of words to form sentences, such as increase in the length and/or complexity of messages, and the construction of word forms such as plurals or tense). • Aided AAC modeling has a positive effect on the production of multi-symbol messages
Receptive Language Skills	<ul style="list-style-type: none"> • AAC as augmented input can enhance children’s comprehension of verbal language and improve communication • Augmented input has been used with children with cognitive disabilities and other developmental disabilities and ASD
Speech Production	<ul style="list-style-type: none"> • There is no evidence that AAC intervention hinders speech production in children with CCN • The majority of cases reviewed demonstrated gains after AAC

	interventions with individuals with developmental disabilities and ASD
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Note. From “Effects of AAC intervention on communication and language for young children”, by Kathryn Drager, Janice Light and David McNaughton, 2010, *Journal of Pediatric Rehabilitation Medicine: An Interdisciplinary Approach* 3 (2010) 303 – 310 (<http://doi.org/10.3233/PRM-2010-0141>).

DISCUSSION

The result indicates that the usage of high-tech Alternative and Augmentative Communication (AAC) has a very limited usage across the country with professionals, parents, and caregivers preferring to use the low-tech PECS (Picture Exchange Communication System) at home as well as in various settings.

There are different articles from different countries that suggest the use of native language in the AAC device is beneficial rather than monolingual language (English).

South Africa

Studies that document the implementation of bi- or multilingual AAC systems seem at present to be limited to case studies and anecdotal reports (e.g. Harrison-Harris, 2007; Stewart, 2017). There may be a number of reasons. There is a prevailing notion that multilingualism may be difficult for clients with communication disorders, especially those who experience these disorders from a young age (De Valenzuela et al., 2016; Drysdale, Van der Meer & Kagohara, 2015; Gutierrez-Clellen, 1999; Levey & Sola, 2013; Yu, 2013). As yet, no empirical evidence supports these suppositions (Kay-Raining Bird, Genesee &

Verhoeven, 2016; Kohnert, 2013; Kohnert & Medina, 2009). However, communication interventionists may still advise clients and families to use only one language (Yu, 2013). Much of the research and technology developments in AAC have been conducted in high-income countries, and specifically in the USA. Even so, developments in AAC have historically focused primarily on persons from monolingual and specifically English language backgrounds (Bridges, 2004). Parents of children in need of AAC who come from non-English backgrounds have remarked on challenges in AAC service delivery related to multilingual aspects, including a lack of AAC systems that give access to languages other than English (Huer, Parette & Saenz, 2001; Pickl, 2011; Singh et al., 2017; Tönsing, K. M., 2019).

India

Another one is the AVAAZ (*sound) an AAC device used in India. Avaz is a picture-based communication application. Moreover, it also has text-to-speech features. Additionally, this app is made in India. It is available in English and six Indian languages

(Hindi, Tamil, Kannada, Malayalam, Telugu and Marathi). Further, the voice output has many gender-based voices to suit everyone's needs. It has a great picture database. It comes with text for each item in the vocabulary (Ayesha, 2021).

It is always good to use a communication device that does support the regional languages of that particular country, here in the Kingdom of Bahrain the majority of the population does speak Arabic and having a Bahraini based device that support the children with communication difficulties as

CONCLUSION

This research is completely based on the author's investigation from a very limited sources as there aren't any evidences or articles that are helpful to conclude the importance of an Arabic AAC device exclusively for this country. It has also been noticed that the amount of speech and language related resources are scarce for the people and for the speech language pathologist working in various settings. More research is required for the importance of high – tech AAC devices for an Arabic speaking population in Bahrain. Although there are still challenges to confront the issues such as cost of AAC systems, issues of probability and durability, app developers and funding of these applications.

Paediatricians and other rehabilitation professionals may be among the first with an opportunity to identify children with communication difficulties and refer them

well as the parents that will be able to manage them within their community such as their family, relatives, and friends will be of great use. There are limited resources that supports the need for Bahraini based high – tech devices in the country due to lack of resources, studies and importance of the use of these devices. A further in detail research can be conducted with this research giving a basic knowledge to how crucial is it to develop an app that is entirely useful for the people of Bahrain.

and their families to programs that can support access to AAC and functional communication. Early intervention can serve as the foundation for their lifelong learning and success.

The outcomes of each AAC strategy could also be compared, and the use of different types of symbols, as different methods may work in different ways for each individuals, and for different age groups. Finally, the training in the use of AAC systems and the variation in the methods of specialists should also be considered as variables in future systematic reviews, because there might be some differential effects on the communicative performance of the children. For all these reasons, meticulous future research is imperative.

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