Assistive Technology Resources for Children and Adults with Disabilities

Closing The Gap

Solutions

October / November, 2023
Volume 42 - Number 4

www.closingthegap.com

STAFF

Megan Turek ..... PRESIDENT

Marc Hagen ..... VICE PRESIDENT MANAGING EDITOR

Becky Hagen..... MEMBERSHIP MANAGER REGISTRATION MANAGER

Callie Kriechbaum..... SALES MANAGER

INDIVIDUAL SOLUTIONS MEMBERSHIP
Membership Rates
1-yr. $449; 2-yr. $748; Parent $275

GROUP SOLUTIONS MEMBERSHIP
Group options available.

SUPPLEMENTAL COLLEGE CURRICULUM – ELECTRONIC TEXTBOOK
Instructors receive a complimentary one-year membership.

Student Membership
1-yr. $125 Standard

Visit
www.closingthegap.com/membership
for complete details and pricing.

PUBLICATION INFORMATION
Closing The Gap (ISSN: 0886-1935) is published bi monthly in February, April, June, August, October and December.

CONTACT INFORMATION
Please address all correspondence to Closing The Gap, P.O. Box 68, Henderson, MN 56044. Telephone 507-248-3294; Fax 507-248-3810. Email <info@closingthegap.com>; Website <www.closingthegap.com>.

EDITOR'S NOTE
The information provided by Closing The Gap, Inc. in no way serves as an endorsement or guarantee by Closing The Gap, Inc.

@ATClosingTheGap

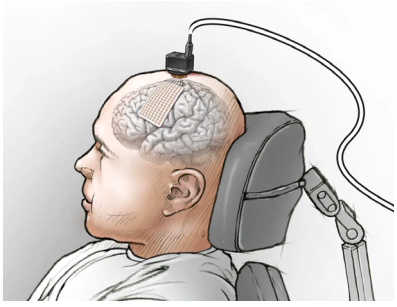
www.facebook.com/ATClosingTheGap

www.instagram.com/atclosingthegap

contents

volume 42 | number 4

October / November, 2023



CVI and AAC:
Using Objects Functionally

Over 55% of communication is visual (1). This includes the things we see like gestures, facial expressions, body movement, and objects in the environment. The presence of any visual impairment must be a major consideration in communication intervention including AAC.

Cortical Vision Impairment (CVI) is the most common form of visual impairment in children (2) CVI is vision loss due to damage or malformation in the brain that interferes with the child's ability to understand the visual information coming from the eyes. It is a visual processing deficit. Other visual impairments we are more familiar with, stem from problems in the eyes themselves.

It is estimated that 10.5% of children with developmental disabilities have CVI (2) Some top causes of CVI are: encephalopathy, intraventricular hemorrhage, infection, trauma, and various genetic disorders. These conditions are also common in children with multiple disabilities. The good news is that unlike other types of vision impairment, with the right intervention, CVI can improve over time (3).

Many of the causes associated with CVI, also impact communication. In other words, CVI can impair the vision of someone who might benefit from augmentative and alternative communication. (AAC) This is why we must take a closer look at how to approach AAC when CVI is also a factor. It may mean rethinking some of the strategies commonly used in AAC intervention. Whenever possible, include a Teacher of the Visually Impaired (TVI) as an integral part of the intervention team. The information they provide is critical when developing an intervention plan. Collaboration is key to success.

Children with CVI experience a range of impact on their vision. No two children will manifest their CVI in the same manner. They must be evaluated and observed individually to see how best to meet their communication needs. It is worth repeating, collaboration is key!! The TVI offers wealth of information regarding children's use of their vision. This information can then be used in designing a functional AAC system.

A TVI that is trained to assess CVI is very helpful. The CVI evaluation process is very detailed and breaks down critical information into very distinct areas (4).

- Learning Media Assessment: determines whether the primary mode of learning is visual, tactile, or auditory
- Appearance of the eyes: do they were glasses, do the eyes work together, presence of nystagmus or strabismus
- Movement of the eyes during visual tasks: can they shift their gaze or require full head movement to move to a new item
- Impact of space and clutter: how much visual background can be tolerated, impacts the number of items that can be visually regarded at the same time
- Form Accessibility: determines whether they recognize 3D or 2D items
- Integration of Competing Sensory Information: is the use of vision impacted by the amount of noise present
- Access to People and Faces: difficulty making or maintaining eye contact or regarding faces (when present, can cause difficulty interpreting body language, gestures and sign language)
- Impact of Light: Can be either distracting or can help draw attention, could also be light sensitivity

LORI DAHLQUIST has a background in the fields of Speech Pathology and Audiology with over 35 years of experience in Augmentative Alternative Communication (AAC) and Assistive Technology (AT). Since 1999, she has worked at Adaptivation Inc. as the Speech/Education Coordinator. She has presented at many conferences and has authored Adaptivation, Inc.'s reference books, Recipes for Success and Adapt This..

BACK TO CONTENTS

- Impact of color: may rely on color to support finding and recognizing an item
- Visual field functioning: looks for limits in visual field as well as preferences
- Attention to movement: could be used to support or distract
- Visual guidance: integrating visual information with motor activities

Each of the above-mentioned assessment areas gives important information in developing an AAC intervention that best meets a child's needs. It will help clarify the specific needs of the child. If we just assume the answers in some of these areas, we can hinder progress and actually make communication more difficult.

For example, let's take the most common intervention strategy used when a child has CVI and needs an AAC system— use of high contrast symbols. In general, high contrast symbols are simple images, usually red or yellow on a black background. They have been incorporated as symbol options in many of the high-tech voice output devices. They are also readily available in other symbol programs such as Boardmaker and on the internet. There are many other teaching resources that have been adapted using the high contrast symbol. Sound great—right? The answer—not always.

This is actually a common misconception. We need to remember, children with CVI have difficulty UNDERSTANDING what is seen. High contrast symbols may attract students' attention but it does not help them understand what they are viewing. We need to be sure our students are at a visual level where they are interpreting what they see. In actuality, high contrast symbols can increase visual complexity of an AAC system because they have multiple colors and many of the symbols are the same color. These symbols also do not portray the actual color of the object in real life. For example, cows aren't yellow. All of this can lead to more confusion for the user. Even more of a problem—presenting 2D symbols when in actuality, the child needs objects! Again, I repeat, the TVI can help determine how to use color functionally and if the child is ready for 2D symbols.

This brings up another area that is often misunderstood when it comes to AAC intervention— the representational hierarchy (listed below). For those in the field of AAC, the use of the visual hierarchy (objects, photos, symbols) does not need to be followed. In other words, a child doesn't have to be introduced to objects before 2D photos or pictures. Research has shown that for children with CVI, it is critical to find where they are on the hierarchy, and start there. With intervention, children can improve their ability to visually process what they are seeing.

Developmental Sequence of Visual	CVI Order of Complexity
• Real Objects • Miniature Objects • Partial Objects • Real Photos • Line Drawings (e.g. Boardmaker, Symbolstix) • Bliss Symbolics • Text	• Single color objects • Multi-colored objects • Patterned Objects • 3D Visual Symbols • 2D photographs of familiar objects • Photographs of unfamiliar objects • Realistic color illustrations • Abstract colorful cartoons • Realistic black and white illustrations • Abstract black and white drawings

Children with CVI that are learning to visually process objects still need access to a robust language system. How can we incorporate objects into functional activities that reinforce communication? Again, COLLABORATION IS KEY! Let's take what is known about developing and reinforcing functional communication and mesh it with the information and intervention of the TVI.

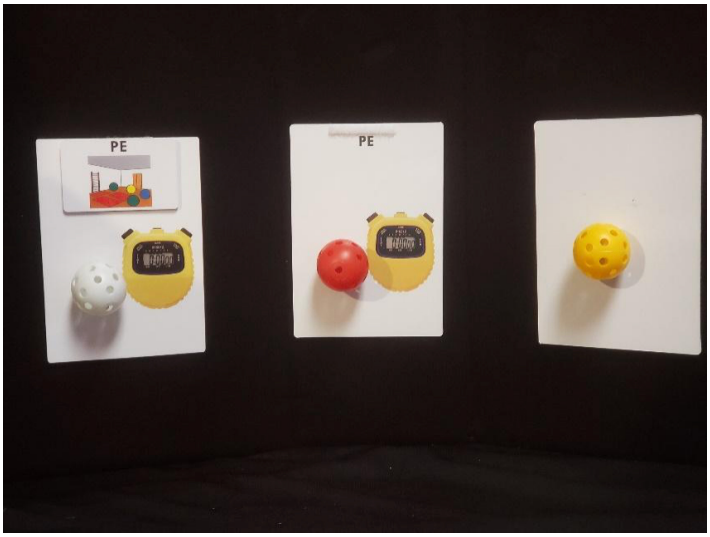
In discussing how to begin teaching object identification, a big question is, "What objects do I start with?" The answer is to use things common to the child's environment such as a cup or a ball. From a communication perspective, also consider what concept that object might be used to represent. For example, can the cup be used to represent "drink" and the ball be used to represent "play," "PE" or the sensory room ball pit? Looking at object identification and communication together is helpful. When using objects that are the same or bare a strong resemblance to what they represent, one runs the risk of the user confusing the symbol with the referent. To avoid this problem, objects can be attached to a material such as a 2D card. This helps establish a clear boundary for the symbol. The size can be determined by the needs of the user and the size of the objects. This also aids in attaching the "symbols" in other areas of the environment such as on tables, walls, doorways, on switches and communication devices.

To this end, Adaptivation offers the Tangible Object Cards. There are a total of 65 cards. The plastic cards are 5x7 inches and come with objects attached. There is also room for a 2D symbol on the card if needed. PLEASE NOTE: THESE CARDS WERE NOT DEVELOPED WITH CVI IN MIND! That being said, there is a lot we can learn from their development and use.

At the time of their development, there were two schools of thought on developing a more "standard" system of objects, Shared or Individualized (5). The Tangible Object Cards were developed with the "shared "approach in mind. In the world of AAC, we try not to have a different set of symbols for each user. For practical purposes, it is much easier to house, maintain and keep track of a shared set of symbols. The use of a standard set of symbols also offers continuity within an organization. For example, if a school uses a shared set of symbols, students moving from classroom to classroom will not encounter a symbol they are unfamiliar with.

BACK TO CONTENTS

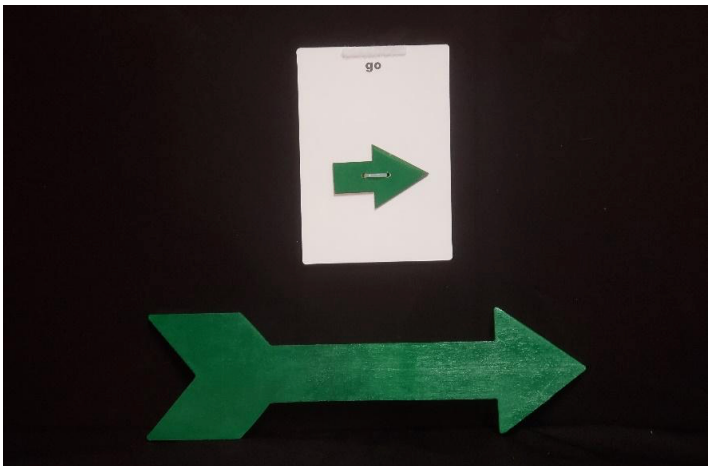
Using an Individualized approach ensures that the objects chosen have meaning and are motivating to the user. The Individualized approach is the preferred approach for children with CVI. Below you will see two examples of how the Adaptivation "shared" approach Tangible Object Cards were modified to meet the individual needs of a child with CVI.

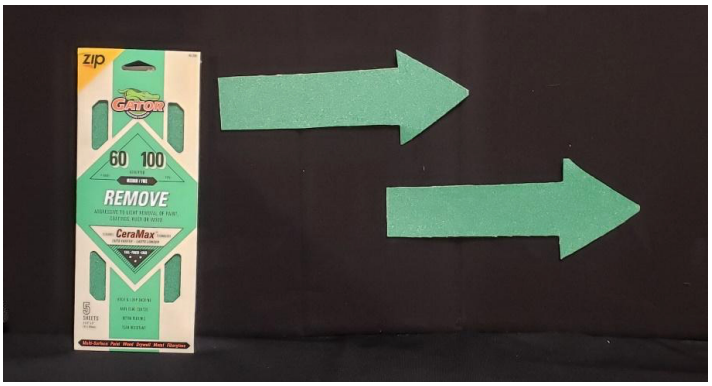


Two examples of how the Adaptivation "shared" approach Tangible Object Cards were modified to meet the individual needs of a child with CVI.

As AAC interventionists, we continue to hear the importance of teaching Core Vocabulary. Core Vocabulary refers to the small number of words that make up 70-90% of what we say. These words are relevant across contexts and have many meanings. Their importance is not disputed, but how does one represent this vocabulary, mainly verbs, using objects? Adaptivation took on this challenge with 15 of the most common core words. The goal for any AAC user including those with CVI is to move from 3D symbols to 2D symbols and then on to a more "shared" symbol set. Adaptivation looked at the most commonly used symbols that represent these core words. The objective was to find objects that looked more like the symbol the user would eventually use. Again, it must be clarified that the core vocabulary tangible symbols were not developed for students with CVI. The question is, "Can this concept be used successfully, keeping the CVI level of the child and his or her personal needs in mind?" -picture of core vocabulary cards

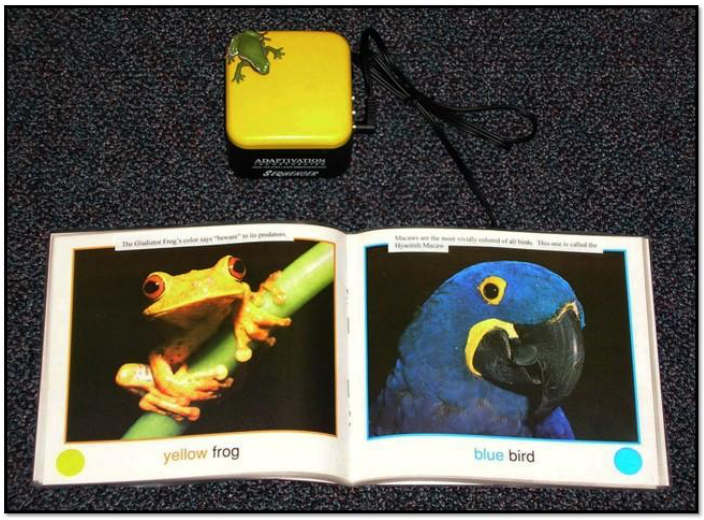
Look at the core word, "go" for example. The most common symbol for "go" is an arrow. In some symbol sets it is green and in others it is red. The Adaptivation object card for "go" is an attached wooden green arrow (see below). For teaching the object, a large wooden arrow was found at a craft store and painted green. This was used during the initial "teaching" of the object. Arrows were cut out of green sand paper and attached throughout the child's environment including the walls and floors. The concept of "go" was reinforced multiple times throughout the day. The hope was to move from the large arrow to the small attached arrow. Think outside the box when establishing an object symbol representing a core word. Again, always consider the CVI level of your students. If the color that attracts their attention is yellow, there is no reason the arrow can't be yellow. You don't have to limit your choice of object to something within the 2D symbol. As a team, brainstorm what vocabulary you want to reinforce and what you can use for the child that meets his or her CVI needs.





Examples of the Core Word, "Go".

Children with CVI benefit from "back up" communication during times when other factors preclude them from using their vision to the fullest. Environmental factors such as visual clutter, time of day and complexity of the activity are just a few of the factors that can lead to visual fatigue. During times of fatigue, students benefit from using simple AAC technologies and communication devices. Such devices include Adaptivation's Sequencer, Randomizer and Medley which can easily be incorporated into literacy and play activities. These devices accommodate real objects and offer voice output.



Adaptivation's Sequencer, Randomizer and Medley.

In summary, the expertise brought by the TVI and the AAC interventionist should be used in tandem to establish the best intervention strategies for children with CVI. There is still so much to learn in both areas but collaboration is key! 0nline resources and classes are available in gaining more information in both areas.

REFERENCES

Haddon, L. A. (2011). Visual Strategies for Improving Communication: Practical Supports for Autism Spectrum Disorders, Troy, MI

Nielsen, L. S., Skov, L., &Jensen, H. (2007). Visual dysfunctions and ocular disorders in children with developmental delay. I. Prevalence, diagnoses and etiology of visual impairment. Acta Opthalmologica Scandinavia, 85(2), 149-156. Don:10.1111/j.1600-0420.2006.00867.

Cortical visual impairment: Symptoms & Causes: Boston Children's Hospital. (N.d.). Retrieved March 25, 2021, from https://www.childrenshospital.org/conditions-and-treatments/conditions/c/cortical-visual-impairment/symptoms-ands-causes

Cortical Visual Impairment: An Approach to Assessment and Intervention, 2nd ed. (2018) Roman-Lantzy, C., Louisville, KY: APH

Rowland, C., & Schweigert, P. (2000). Tangible Symbols, Tangible Outcomes. Augmentative and Alternative Communication, 16, 61-78.

RESOURCES

Adaptivation Inc. www.adaptivation.com

Perkins School for the Blind. https://www.perkins.org

Praaticalaac.or ■

BACK TO CONTENTS

"Ain't No Mountain High Enough!"
Independency Through Technology for People with Complex Needs and Visual Impairments.

INTRODUCTION

We live in a digital society and technology is everywhere. It is intertwined with our lives. Technology is in the smartwatch on your wrist, in the phone that is in your pocket or in your car key that automatically opens your door. With the click of a button or a swipe on a smart screen the world is within our reach. From Wi-Fi connectivity to navigation through Google Maps and the convenience of smartphones, these tools have become essential for starting our day right. The impact of technology on our lives has far exceeded our expectations, evolving into what is now our new normal.

But what impact does the use of technology have on those with complex needs? The answer is unfortunately not the same. Persons living with complex needs face daily obstacles and are usually unable to benefit from that same digital society. But when a person has complex needs and a visual impairment, these obstacles can be even higher and participating and benefiting from the opportunities that technology can offer are not as self-evident. Sometimes it seems that overcoming the challenges for this target group is a too big of a hill to climb.

Does a person with complex needs and a visual impairment encounter the same limitations as an individual without disabilities when the technology they rely on isn't accessible to them? It is highly unlikely. For those without disabilities, technology often serves as a tool to enhance convenience: They might be able to manage without gadgets like fitness trackers, voice assistants, or smart home systems. However, the scenario is notably different for people living with complex needs and a visual impairment. Unfortunately, for this target group technology is often more than just a gadget and can be beneficial in many ways. For instance: Technology may serve to compensate disability and support learning in classroom situations. It can be a valuable leisure activity, aid and broaden communication with friends and family or even enable greater participation in the community and promote independence.

At Bartiméus, a leading center of expertise for the visually impaired in the Netherlands, the challenge of enabling e-Inclusion to clients with complex needs has been a long-standing one. At Bartiméus, over 500 people with complex needs and a visual impairment live at several assisted living arrangements and receive 24-hour care.

Bartiméus believes in, and strives for, an inclusive society for the visually impaired. Those living with only a visual impairment already have access to many tools that can aid or compensate their disability such as braille, iPhones and aides for enlarging text. For people with both a visual impairment and complex needs, these solutions are often too complex. Generally, this target group cannot read or write and because of their cognitive disability are unable to benefit from the many solutions developed for people with a visual impairment. However, these people too have the same needs and wants to be more self-sufficient.

In order to meet these needs, Bartiméus has set up a special taskforce called 'The FabLab', (Fabrication Laboratory) which has become the epicenter within the organization for adapted and accessible ICT, technology and tools for people with multiple disabilities. It is our belief that every person should be able to participate in the digital society. The FabLab has researched and developed a range of innovative products and leads ongoing projects specifically for people with multiple disabilities and visual impairments.

MAAIKE MEERLO is a consultant assistive technology and healthcare innovator at Bartiméus, a center of expertise for the visually impaired, in the Netherlands. She is one of the experts of the innovation lab known as 'FabLab' and tries to find, create, and implement solutions for those with complex needs and visual impairments and leads ongoing technology projects aimed at elevating the quality of life and self-reliance of this specific target group. The author of this article has no affiliation with the products and brands named in this article.

BACK TO CONTENTS

'CAN DO' MENTALITY.

Since 2007 the FabLab has been trying to find smart solutions to the personal challenges of the people who live, work and go to school within our organization. The residents and students are people with a developmental age between 10 months and 8 years and their level of care depends on their additional disabilities (physical disability, autism spectrum disorder and other medical challenges), but generally speaking all 500 residents need 24-hour care. Because the digital society is all around us, the FabLab detected the need for smart solutions for the personal challenges our clients face on a day-to-day basis. The FabLab has three main functions:

ADVICE AND CONSULTATION

The largest amount of our work consists of consulting and advising residents, their parents, teachers and healthcare professionals. They can request a consultation in which we explore a person's challenges and try to find a fitting solution.

SHARING EXPERTISE AND EXPERIENCES

Having multiple disabilities and a visual impairment, a person automatically belongs to a niche target group. Solutions often need to be tailormade to suit their needs to enhance quality of life. Over the years, the FabLab has gained expertise that is quite specific and unique. The FabLab aims to share information and tries to raise awareness of the importance and benefits of enabling clients to experience technology.

INNOVATION AND DEVELOPMENT.

Technology and its possibilities are ever changing. Keeping up with the latest technological opportunities as they arise is very important. In some cases, creating our own bespoke solutions is the only option. We often collaborate with universities and other healthcare professionals for developing innovative products that suit the specific needs of the target group.

FROM PERSONAL CHALLENGE TO SOLUTION

The examples of personal challenges range from being able to send emails, listening to music, mobility challenges to feeling safe at night (proximity). These daily tasks are generally occurrences that this target group needs help with from a caregiver or teacher. They are the day-to-day things that a person without a disability can execute without any thought. Solutions developed in the assistive technology field are wonderful but can often not be used by those with a visual impairment. Many products use sight to compensate a disability, for instance AAC devices that use touch screens and pictograms to enhance communication or a visual timer that supports time management. When a person has multiple disabilities in addition to sight loss, overcoming the challenge of enabling access and independence requires specific adaptations and strategies. The method on how to find certain strategies and (tailor-made) solutions are all combined in an organization-wide e-Inclusion-for-all-strategy that has been implemented for our clients with complex needs.

Our strategy is question and problem solved-based and assumes that there is always a solution available. It focuses on delving into a person's personal challenges and really tries to figure out which part of a person's quality of life and/or self-sufficiency can be enhanced. We often ask the 'question behind the question' and try to define the goal of use of technology. Technology is used as a means, not an end. The personal challenges encompass the components of the International Classification of Functioning, Disability and Health (ICF). These classifications are used to determine the severity of someone's disability. It often looks at someone's incapability in areas such as mobility and motor development, communication, social activities and leisure, learning and applying skills and self-care. At the FabLab, we strive to approach these classifications and limitations from a unique perspective: how can technology be used to amplify quality of life, transforming "it's not possible" into a resounding "yes, you can!" Our mission revolves around converting as many limitations as possible into newfound abilities.

Several of the ICF classifications contain reoccurring themes that are often part of individual challenges that require a solution. Within these classifications mentioned earlier, there are a couple of reoccurring themes that are common for individual challenges.

Access to information.

Because of their visual impairment, almost all clients need help accessing information. From newsletters to reading emails or postcards from relatives to a personal care plan or invitation for a doctor's checkup: almost all written text needs to read by a teacher or caregiver. There are several solutions to provide accessible access to information such as text-to-speech solutions such as the ClearReader or the digital label reader PennyTalks.

Mobility and orientation.

All people with multiple disabilities and a visual impairment have mobility issues. Some people are able to learn certain routes in a familiar area, however, many need help from a sighted person getting from A to B. We try to find solutions for smaller mobility challenges such as finding your way from the bathroom back to your bedroom by for instance installing a Google Home speaker in each room and following the sound that's playing on a specific speaker.

Leisure activities.

Gaming, using an iPad of listening to music: each are examples of daily entertainment that requires adaptations. Nowadays many products offer touch screens only, something a visually impaired person cannot use. We try to find solutions and products that suits a person's abilities.

Time management

Learning to tell time and being able to manage time, is a challenge on its own. But when you have not been able to see a clock and are unable to grasp the passing of time, overseeing

BACK TO CONTENTS

how long an activity takes or how long it takes until the next activity begins, is very difficult. Some persons with a visual impairment are unable to see light which also means that experiencing the sun going up or down can make it challenging to maintain a night and day cycle.

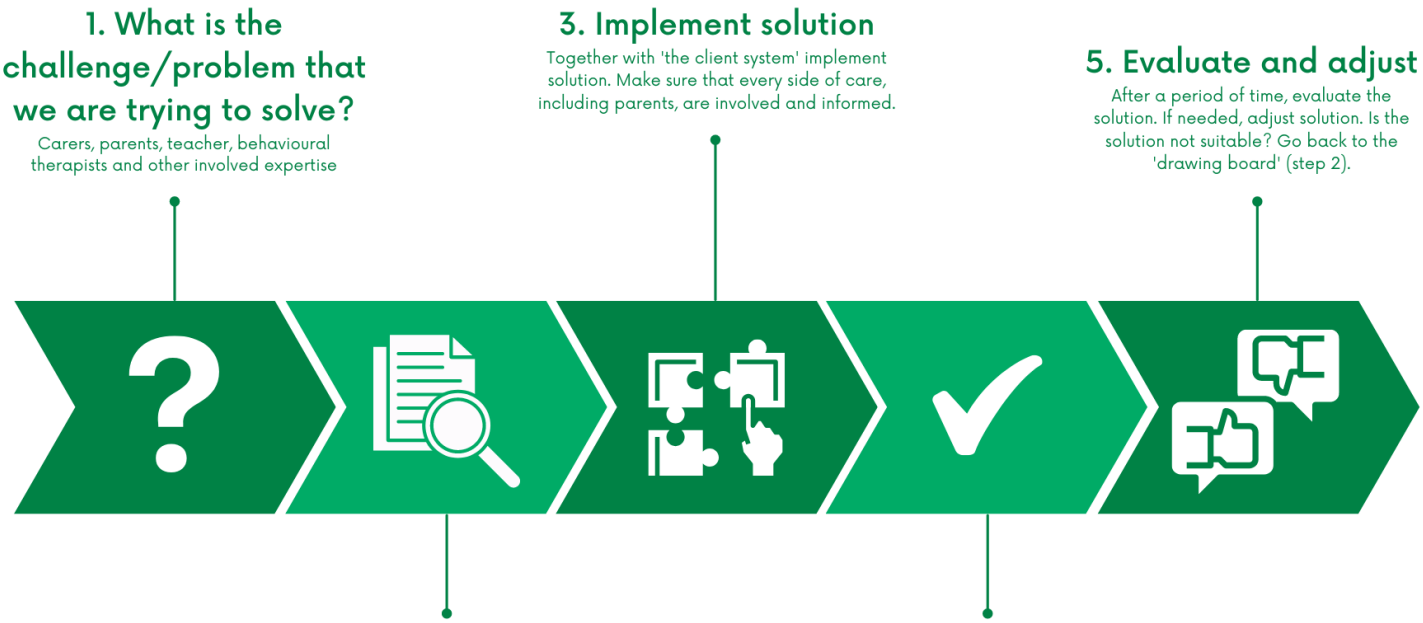
There are so many technological possibilities. Solutions do not need to be big or grand to have an effect. Even the smallest type of technology can have a big impact. Technological solutions can be divided into three categories. Consumer technology, assistive technology and 'blind tech'- technology especially developed for people with a visual impairment. We always try to look for solutions in consumer technology first. That doesn't mean we rule out assistive technology. Using consumer technology often means that a product is widely available, that it is well-made, not stigmatizing and often quite budget-friendly. This stands in contrast to assistive technology and customized solutions, which tend to be less readily available and might come with a higher cost.

Occasionally, an existing solution needs to be adapted to achieve the best usage. Adaptations can be small such as making buttons tactile with felt or other textures, but sometimes a product needs a bigger adjustment such as making it switch accessible.

There are also many examples of personal challenges in which there is no ready-made solution available in consumer technology and in which we need to develop a tailor-made solution. For example, there are little to no solutions developed for people with deafblindness and complex needs. The only option is to create bespoke solutions. The challenge that must always be taken into consideration is that developing individual solutions are often costly and usually not applicable on a larger scale.

Once an individual's specific challenge or issue has been identified, a trial phase is initiated. Collaborating closely with an educator or caregiver, the FabLab undertakes the implementation of the selected solution or product. This is followed by an evaluation in which the effectiveness of a solution is assessed. If needed, a solution is adapted or adjusted to align more precisely with the person's requirements. It is also a possibility that the chosen solution or product is not a success which means we must go back to the drawing board and start from the beginning.

Methodology



BACK TO CONTENTS

Addressing the unique challenges faced by individuals with complex needs and visual impairments requires both experience and a fresh perspective. Experience helps us understand their specific challenges, while a new viewpoint sparks innovative solutions. By combining what we've learned with new ideas, we can develop better ways to use technology and improve the lives of these individuals. This dual approach not only draws from past successes and lessons learned but also encourages a forward-thinking mindset that embraces the rapid evolution of technology but also challenges to look at technology with a more creative mentality. Often, one technological solution can be used for many different personal challenges. This approach keeps us adaptable and open to new technologies, ensuring we provide effective support tailored to their needs.

This strategy is the result of years of experience and trial-and-error and has been adjusted along the way. We have tried to develop and implement a holistic and sustainable approach that suits the needs of people with complex needs and a visual impairment.

This is Ricardo. Het is 57 and has little vision left. He also has early-onset Alzheimer' disease. Ricardo uses a walker during the day and can get around the house by himself. His carers often need to remind Ricardo to use his walker. For the last couple of weeks Ricardo made a bad fall during the night when going to the bathroom. He forgot to take his walker. At night Ricardo is being monitored from a distance and there is not a carer in the direct vicinity. Together with staff we thought about a solution and installed a sensor used generally in shops and stores that plays audio once it detects motion. In this case it would start to play: "Don't forget to take your walker, Ricardo" when the senor would detect Ricardo's feet touching the floor. It took a little bit of experimenting and adjustment of the audio, but since the use of the sensor, Ricardo has not fallen at night.

Practical example of consumer technology

Heidi is a 54-year-old woman with congenital deafblindness. Because of her cognitive disability Heidi has little sense of time and has trouble estimating when her next activity begins. This caused a lot of stress, sometimes even self-harm. Traditional aides for time management such as audio watches or a Time Timer are ineffective because as she cannot see or hear them. We developed a cushion which would be offered to Heidi whenever there were moments she would have to wait. Using varying vibrating patterns, it helps Heidi sense time passing, with vibrations intensifying as minutes elapse. When waiting ends, a distinct vibrating pattern signals the activity change. The use of this product took a lot of training, but resulted in less stress and self-harm.

Example of a bespoke solution

Technology Trend watching

In addition to finding and developing solutions for our clients' individual challenges, the FabLab is committed to staying at the forefront of the latest technological advancements. We actively seek out new opportunities that hold significant potential for enhancing the lives of those with visual impairments and complex needs. When in 2018 the smart speaker Google Home was introduced in Dutch, we immediately initiated pilots across several living arrangements. Our expectations were positive, yet the extent to which this device would empower users in achieving self-sufficiency surpassed our initial forecasts. Basic tasks like setting alarms, timers, tuning into radio stations, fetching information, and enjoying news or music suddenly became achievable without the need for caregiver assistance. A new digital world with new possibilities became available.

Following two years of comprehensive piloting, we resolved to introduce Google Home speakers within our three residential care facilities. We aimed to make these devices accessible to all interested and capable users. The implementation journey was marked by numerous challenges, including ensuring WIFI availability across all locations, navigating strict privacy and data-protection regulations within the healthcare sector, and addressing the digital hesitancy among caregivers. Yet, the effort was undeniably rewarding. As we began deploying the devices in communal spaces and individual bedrooms, the clients' response was overwhelmingly positive. Contrary to our concerns about hesitancy toward a novel and unfamiliar product, most individuals embraced this innovative product with open arms.

It was as if they had finally found a tool devoid of the barriers posed by touchscreens or complex buttons, and most notably, one that required no visual assistance to complete tasks that had previously necessitated help from a sighted person. With simple voice commands, they could now listen to their favorite music, acquire information about subjects of interest, or even just inquire about the time. The project team was amazed by not only the increase in self-sufficiency, but also observing a surge in pride and self-esteem derived from accomplishing tasks independently.

Google Home speakers

BACK TO CONTENTS

Rather than directing their frustration at caregivers, some began using Google Home as an outlet for their emotions

In addition to general use of Google Home commands mentioned earlier (telling time, listening to music and setting alarms), we encountered a surprising yet beneficial use of the device. Several clients grappling with behavioral challenges, often struggling to manage their anger, surprised us with an innovative approach. Rather than directing their frustration at caregivers, some began using Google Home as an outlet for their emotions – an unexpected twist. When confronted with anger, they would direct their frustration towards the device, in a sense "venting" through it. This unconventional adaptation intrigued us, prompting further investigation. The consistent explanation of why they used Google Home in this manner was striking: Google Home's consistently gentle and non-confrontational voice responses serve as a calming presence.

This way people use Google Home to feel better when they're upset shows how technology can benefit them. It is a modern way to handle feelings, and a technological coping mechanism.

Amanda loves music. She has many CDs and can spend hours in her bedroom relaxing and listening to music. Unfortunately, her CD player has broken and repairing it is not possible. Additionally, CDs are no longer the standard for music consumption. Streaming music via apps like Spotify or Apple Music has become the norm. However, using a smartphone for streaming music is not feasible for Amanda. She faces challenges with reading and writing, making the use of a smartphone or a music streaming app too complex. Collaborating with Amanda, we explored more accessible options for streaming music. The Jooki Music Player emerged as the optimal choice. This player enables users to link songs or playlists from Spotify to RFID tokens. Thanks to the tactile tokens and user-friendly buttons that are easily clicked into the device, Amanda can now independently stream her favorite songs.

Practival example of consumer technology

Inspiration leads to innovation.

The rapid evolution and frequent breakthroughs in technology bring about dynamic changes on a daily basis. The amount of new technological solutions that are being made available, is sometimes a challenge to keep up with. For healthcare professionals, keeping up with the latest advancements can be an complicated task. For them it is often difficult to envision the potential that technology can have for their clients. Therefore, we have created three dedicated spaces which showcase the very many technological solutions that can aid the advancement of self-sufficiency and quality of life.

In our three specialized technology labs clients, healthcare professionals and other visitors can try and experience the possibilities of various technology products. The Speech Lab offers an opportunity to explore voice-controlled devices and room interactions. The Inspiration Lab replicates a domestic living environment seamlessly interwoven with technology, enabling individuals to acquaint themselves with a diverse range of innovative products and technological solutions available. The Makers Lab serves as a space for crafting ad developing tailor-made solutions. Visitors can experience the value of having bespoke solutions made for a specific problem or personal challenges.

The technological solutions to enhance self-sufficiency can only be successful if a client-system is involved. A client-system often exists out of parents, caregivers, and other healthcare professionals such as an occupational therapist or a behavioral expert. The solutions, no matter how big or small, needs to implemented and become part of a person's life and routine.

By sharing success stories and best practices, we not only inspire healthcare professionals with practical insights but also create a sense of purpose and enthusiasm for including technology into their care approaches.

The healthcare sector is changing. In the foreseeable future there will be less caregivers available for the amount of care needed. As professionals witness the noticeable impact that technology has on the well-being and self-esteem of their clients, they are more likely to embrace change, adapt new tech-

niques, and collectively contribute to the advancement of technologically driven healthcare for all.

The road to independence.

In a world where technology seamlessly is part of every facet of our lives, those facing complex needs find themselves dealing with many obstacles. The journey to overcome these obstacles has many sides, requiring innovation, a creative view on technology and determination to bridge the gap between limitations and opportunities.

The journey to independence is ongoing, as technology continues to evolve and inspire. Although it may seem that finding solutions for the most complex personal challenges is impossible, especially for those with a low cognitive development and a visual impairment, it's essential to approach technology with a mindset of creativity and possibilities. Because when we do this, no challenge is too great and with the right tools and determination, no mountain is high enough!

Products mentioned in article:

- ClearReader Basic
- PennyTalks voice lableler
- Audio Motion Sensor
- Jooki Music Player ■

BACK TO CONTENTS

UPCOMING WEBINARS

Adapt, Play, Connect

By Teresa Glardina and Courtney Grimes
Wednesday, October 25, 2023
3:30 pm – 5:00 pm (Central Daylight Time)

Teresa Glardina, is the Co-Director of HMS Connect and a special education teacher at HMS School for Children with Cerebral Palsy where she has been employed for over a decade. Her professional journey started with volunteer opportunities, then paraprofessional work, onto a classroom teacher, and now education administration. Teresa is a proponent of DIY assistive technology, playful exploration, and interpersonal play.

Courtney Grimes, has been a special education teacher at HMS School for Children with Cerebral Palsy for 17 years. Her early experiences as a camp counselor at Easter Seals inspired her to infuse play and playful exploration in all that she does. Courtney aims to create accessible play activities for all her students using assistive technology and creativity.

Includes 0.2 IACET CEUs 1.5 ACVREP CEs and/or Closing The Gap Issued Certificates of Contact Hours.

Students with Complex Needs are often unable to participate or access games/activities during school events. Students with Complex Needs are often placed to observe play. A few key purchases and an imagination can change the role from observer to participant!

This interactive workshop will both outline the importance of accessing assistive technology in play for all individuals and discuss techniques for how to put this into practice. Presenters will demonstrate the effectiveness of including assistive technology that can be utilized for play, along with specific examples. Examples will include students/clients with complex needs evidenced by physical/motor impairments, intellectual disabilities, and extraneous factors such as cortical visual impairment.

Presenters will identify key strategies used within a holistic setting to implement these strategies within school, home, and community settings. Discussion will include specific information related to training new team members, family members, etc. for populations outlined. The presenters will open the topic for participants to discuss their own experiences with various populations in AT-based intervention. will be shared with participants.

Learning Outcomes – As a result of this activity, participants will be able to:

- Understand why it is important to self-reflect and make changes to be a better communication partner.
- Learn about a variety of strategies to support communication growth in others such as, but not limited to modeling without expectation, providing active feedback, and creating an aided environment.
- Apply these teaching strategies to, and have an opportunity to share their own ideas!

Effective Teaching Strategies: Working with Complex Communicators

By Lindsay Hendricks
Thursday, November 16, 2023
4:30 pm – 5:30 pm (Central Daylight Time)

Lindsay Hendricks, M.S., Speech Language Pathology, SLP, AAC Specialist. Your Voice Matters Speech Therapy.

Includes 0.2 IACET CEUs and/or Closing The Gap Issued Certificates of Contact Hours.

This webinar will start by reviewing a few key terms and concepts such as core/fringe vocabulary, robust AAC systems, presuming competence, and functional communication. These ideas are essential in providing the most effective teaching strategies to those with complex communication needs, and will be integrated into the discussion as they apply.

Participants will learn to improve their communication partner skills and a variety of strategies that support the development of communication skills in others. Discussion will focus on communication partner skills and passive teaching techniques. These ideas will then be applied to day to day activities that can be used at home, in therapy, or at school!

Learning Outcomes – As a result of this activity, participants will be able to:

- Understand why it is important to self-reflect and make changes to be a better communication partner.
- Learn about a variety of strategies to support communication growth in others such as, but not limited to modeling without expectation, providing active feedback, and creating an aided environment.
- Apply these teaching strategies to, and have an opportunity to share their own ideas!

Closing T
CONFE

OCT. 11-13 MI
Pre Conference W

41ST ANNUAL CONFERENCE
OCTOBER 11-13, 2023

Pre Conference Workshops: Tuesday, October 10, 2023

HILTON MINNEAPOLIS HOTEL

See why Closing The Gap has earned a reputation for exceptional learning and plan now to join us for Closing

The Closing The Gap Conference is an annual assistive technology conference that presents an opportunity to deepen your assistive technology (AT) knowledge and strengthen your implementation strategies. The conference week is designed to dig deeper into critical areas that have the power, when implemented strategically, to transform your classroom, your school, your district, your practice. When you start thinking differently about how to reach ALL students, how to infuse technology into learning, how to leverage AT strategies in all areas – then we begin to transform these areas and ultimately increase achievement and independence.

he Gap 2023
RENCE
NNEAPOLIS, MN
Workshops: Oct. 10

PRE CONFERENCE WORKSHOPS
TUESDAY, OCTOBER 10, 2023

IN-DEPTH LEARNING Pre conference workshops focus on assistive technology implementation and best practices. Each workshop is conducted by a nationally recognized leader in the field, providing in-depth professional skills necessary to successfully implement assistive technology in the lives of persons with disabilities. Workshops range from introductory to advanced and cover many different topics.

3-DAY CONFERENCE
WEDNESDAY, THURSDAY AND FRIDAY
OCTOBER 11-13, 2023

COME, NETWORK, LEARN – Discover rich resources and tools that support students in accessing instruction and enhance learning opportunities.

Attend sessions filled with practical and applicable strategies and best practices. Visit the exhibitors, meet with representatives, learn first-hand about the latest technologies making a difference today.

LEARN MORE

The Future of Education and Interactive Learning:

A Case Study at Eastern Suffolk BOCES

ACTIVE FLOOR
Jump 'N' Learn

COLLEEN KENNEDY-DIETRICH,
Special Education Teacher, Eastern Suffolk BOCES – Brookhaven Learning Center

TARA ROGERS,
Public Relations Specialist at Eastern Suffolk BOCES, New York State's largest educational cooperative, which services 51 component school districts in Suffolk County.

SALLY BLANK,
Channel Manager – The Americas, ActiveFloor

MINNAH MATINE RIIS,
Head of Marketing, ActiveFloor

INTRODUCTION:

Join the future of education! EdTech is constantly transforming to enhance educational environments and meet the needs of student and teacher. By implementing EdTech into educational environments, educators will engage students in new and motivating ways and eliminate barriers and encourage inclusivity. The EdTech evolution will enhance innovation, teaching methods, assistive technology, and interactive learning. This case study highlights interactive learning in special needs education and empower all in actively shaping the future of education.

BACK TO CONTENTS

THE RISE OF INTERACTIVE LEARNING.

Interactive learning has proven to promote student engagement and active participation through creativity, movement, teamwork, collaboration, and communication. With interactive learning, educators can choose to leverage various technological tools and platforms to create immersive experiences that provide children with equal access to auditory, visual, and kinesthetic learning. Most educators of children with Special needs understand that one-size-fits-all instructional approaches are impractical and ineffective in their unique learning environments. So now we see that, more and more educators have followed the EdTech evolution and are experiencing how learning can transform from a passive process into an exciting interactive adventure by implementing gamification, virtual reality, simulations, collaborative online platforms, and more in the different educational environments.

In conclusion, the integration of EdTech goes beyond enhancing interactive learning – it represents a revolutionary approach to education that acknowledges and embraces the diverse learning needs of all students. By leveraging technology in educational settings, educators can create personalized, engaging, and inclusive learning experiences that empower students to become active participants in their own education journey. As the EdTech evolution continues, it promises to reshape education and unlock the full potential of every student, ensuring a brighter and more equitable future for all.

COMBINE THE BODY AND THE MIND.

When children engage in traditional free play at school, they experience many benefits. During playtime, they use their senses and interact with the environment, which helps them develop in different areas. One way to approach how implementing EdTech can have a positively impact children's development is from the perspective of Embodied Learning (EL). EL combines the body and mind in the learning process and has been proven to enhance children's development in three areas:

- the physical development,
- the cognitive development,
- and the social development.

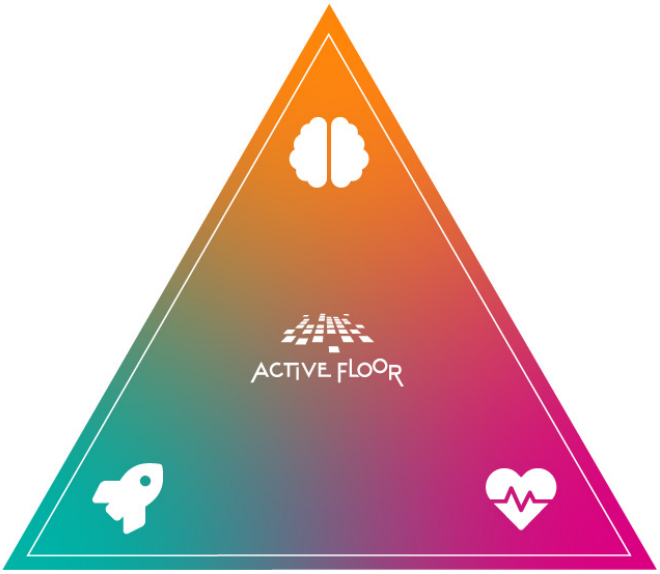
Focusing on EL in the learning process has a positive effect on the overall educational performance. Not only does it improve the memory and the transfer of learning to other areas, but it also fosters a positive attitude towards learning. Physical actions during embodied learning also enhance immersion and the understanding of the content being learned.

Many interactive playgrounds in the EL approach have been designed to develop at least one of the three development areas of EL, but ActiveFloor is designed to effectively address all three! ActiveFloor significantly improves children's overall development, with a particular emphasis on the cognitive and social areas. Advanced interactive playgrounds play an increasingly important role in enhancing education environments in the future. Therefore, the use of technologically-based EL tools like the ActiveFloor has the potential to greatly improve child development.

JOIN THE FUTURE OF EDUCATION WITH THE ACTIVEFLOOR FAMILY LIKE EASTERN SUFFOLK BOCES.

ActiveFloor is a family-owned EdTech company headquartered in Copenhagen, Denmark, that was founded in 2015 with the belief that learning should be fun and with an ongoing mission to provide children of all ages with the possibility to learn and develop both intellectually, physically, and socially in a way that is most natural for them – by using their entire body. The award-winning interactive learning solutions created by ActiveFloor have already been embraced all over the world by schools, daycare programs, museums, children's hospitals and more.

Eastern Suffolk BOCES, an inclusive educational cooperative of 51 Long Island, New York school districts, has chosen ActiveFloor for their instructional programs. Brookhaven Learning Center's addition of an ActiveFloor for their students has proven to be a huge success. The interactive technology has connected learning with the entire body, with fun and play for all the students, both in lessons and social activities. BLC Principal, Nicole Drinkwater, and her team discovered ActiveFloor and advocated to acquire it for the students. ESBOCES Special Education Department subsequently added ActiveFloor (Model: PRO2) interactive learning solutions to their other departments at Westhampton Beach Learning Center, Samoset Middle School, Sayville Elementary School, Premm Learning Center, and Tecumseh Elementary School.



"The mission and goal of ActiveFloor is aligned with everything that we believe in and do at Eastern Suffolk BOCES, as ActiveFloor believe that utilizing the entire body represents the most natural way for students to learn" - **Gina Reilly, ESBOCES Director of Special Education**.

BACK TO CONTENTS

UNLOCKING THE POTENTIAL OF ASSISTIVE TECHNOLOGY.

Assistive technology encompasses a wide range of tools, software and devices designed to enhance the educational experience and level the playing field for all learners. From screen readers and speech recognition software to adaptive learning platforms and specialized hardware, assistive technology empowers students with disabilities or learning differences by addressing their unique needs, enabling them to access educational content, participate in classroom activities, and demonstrate their knowledge effectively. By removing barriers and providing personalized support, assistive technology reinforces inclusivity in educational environments.

ActiveFloor is an interactive universe that provides sensory integration and learning games for students of all ages and abilities. Students navigate various activities and education games by using their feet and in some cases their wheelchairs. Incorporating movement and play into learning helps memory, collaboration, focus, motor development and social skills while creating an exciting educational environment.

An ActiveFloor solutions does in practice consists of a ceiling mounted box, containing a projector and a tracking camera, that projects the games and content on a white vinyl floor (or wall), with the tracking camera allowing the games being assisted and played by the feet, hands, balls, robots, or wheelchairs.

Assembly an online platform (MyFloor) is connected to each floor. In MyFloor you will find a game library of more than 10,000 different games. The games, with content for math, language arts, science and more provide teachers with opportunities to integrate movement and fun into all subjects and lessons. Also, every teacher has the option to create unique learning games to add to the library and the floor, that allows each teacher to create unique content in the level and ability for all students.

Regardless of age or abilities, ActiveFloor offers content and games for everyone. Even students with multiple disabilities can sit and play in the leaves, watch the fish swim around the floor and splash along with them, or watch bubbles move around the floor.

"What we love most about ActiveFloor, is the ability to customize the games to meet all the needs of our students. Differentiation is key for our population of students." – **Colleen Kennedy-Dietrich, Special Education Teacher, Eastern Suffolk BOCES, Brookhaven Learning Center**

BEST PRACTICE OF CUSTOMIZING ADAPTIVE PLAY.

The combination of interactive learning and assistive technology can be very powerful! By creating interactive learning environments that are adaptive to the abilities of the user, the learning experience will become very inclusive and dynamic. For example, in ActiveFloor interactive educational games can be designed with built-in accessibility features, allowing students with visual or hearing impairments to participate in learning activities alongside their peers.

Each class at Brookhaven Learning Center has scheduled times throughout the week to use the ActiveFloor and extra times are available for all students because of all the floor offers

BACK TO CONTENTS

academically and socially. Students are given time to dance and play sports like soccer and air hockey with each other, which have created and even more inclusive environment.

At BLC, students get to utilize the ActiveFloor for a minimum of 30 minutes a week. Each teacher receives a half hour time slot and can use their time as they see fit. Each teacher has a customized playlist where they can easily access games that they have created or found in the general library. Additionally, all the teachers have access to specially customized educational playlists. These playlists include games and activities that pertain to specific seasons, holidays and/or events. Teachers can also access games that reinforce building-wide curriculum. After teaching a lesson in the classroom, the students can complete a follow up activity on the floor that reinforces the content learned in a fun and engaging manner!

""This spring we added a Spring matching game, a Spring Social spinner, as well as a Sock Sorting game to honor World Down Syndrome Day. Our memory matching games can be modified to different levels based on the array of pictures included or the type of matching (picture to picture, word to picture, array of 8 or an array of 16). In addition to academics, our students love using the ActiveFloor as a means of sensory integration. Our floor has a specific playlist dedicated just to sensory integration." **Tara Rogers, Public Relations Specialist / Communications & Research, Eastern Suffolk BOCES**

CREATE AN INTERACTIVE LEARNING ENVIRONMENT WITH A FLOOR, WALL OR EVEN A TABLE.

With ActiveFloor, there are multiple possibilities to create a dynamic and inclusive interactive learning environment. The system offers a wide range of models that can be mounted in the ceiling or the mobile versions, to move around where needed. Individually they are capable of projecting onto the floor, wall, or even at a table. This versatility provides users of all abilities with the opportunity to engage and play. The interactive technology fosters active participation, encourages creativity, and caters to diverse learning styles. Whether mounted on a wall, placed on a table, or projected onto the floor, ActiveFloor empowers students to interact and learn in a fun and accessible way.

The MobileMax ActiveFloor models, can be positioned at a tabletop height for those who need to be seated and can participate in game-based play using their hands or other pointers.

LET'S ENTER THE FUTURE OF EDUCATION TOGETHER WITH ACTIVEFLOOR.

Learning through play and movement is an effective and motivating approach to reach students in all stages of their educational development. From early childhood cognitive and motor skills to one-on-one and small group sessions with occupational therapists or speech therapists, there are countless combinations of customizable play-based learning activities available in the ActiveFloor platform.

"Our students love to get up and move!! Soccer may be a fan favorite in our building. Whether the students are dancing to songs on the TV Tube, scoring goals in soccer, or playing Air hockey- they student love being active and social with their peers." – **Colleen Kennedy-Dietrich, Special Education Teacher, Eastern Suffolk BOCES – Brookhaven Learning Center**

BACK TO CONTENTS

At Eastern Suffolk BOCES, they are fully immersed in shaping the future of education. Witness their narrative of usage in an insightful Q&A session with Colleen Kennedy-Dietrich, Special Education Teacher and Tara Rogers, Public Relations Specialist / Communications & Research from Eastern Suffolk BOCES.

Q) What was the motivating factor for your school to focus on new ways of learning?

A) Eastern Suffolk BOCES is an inclusive educational cooperative that works with over 51 Long Island Districts. ESBCOES provides direct instruction, behavior management and various support for students with multiple disabilities. Nicole Drinkwater, Principal at Brookhaven Learning Center (BLC), was interested in providing her students with a new and innovative way of learning-- the ActiveFloor was the perfect fit!

Q) Why did you choose to implement ActiveFloor?

A) After researching different interactive learning devices, the ActiveFloor seemed like the best fit for our program. It allows all students, both ambulatory students and student in wheelchairs, to access the floor and participate in interactive learning. It included academic material, sensory integration, as well games that promote social interaction. At Brookhaven Learning Center, we are a developmental program and focus on life skills in addition to academic curriculum. The floor allows us to create games that pertain to both areas.

Q) How many units have you purchased?

A) Brookhaven Learning Center started with one unit in our main building, and gained a second unit a year later. After seeing the floor in use, Eastern Suffolk BOCES decided to add several more units to other buildings within the organization.

Q) Where are they located? (classroom, media center, activity room, etc)

A) Our main unit at BLC is located in a section of our cafeteria that is now designated to our ActiveFloor. The unit in our second building is located in a communal classroom.

Q) How often are you using ActiveFloor?

A) At Brookhaven Learning Center, we use the ActiveFloor throughout the entire school day. Each classroom teacher receives a 30-minute time slot, once a week. Our speech teachers are able to sign up for the remaining 30-minute time slots and provide group speech sessions on the floor.

Q) How many students are using ActiveFloor at one time? Do you work in small groups or one-on-one with a student?

A) For the most part, the floor is used as a group activity; classes bring anywhere from 5-12 students down to use the floor. During speech sessions, a therapist may bring 1-4 students. The floor is occasionally used for individual sessions as a reward/earning incentive for specific students.

Q What kind of improvements have you noticed among your students since using ActiveFloor?

A) The floor has helped students with turn-taking skills; our students need to wait patiently while other peers are using the floor. The floor has also promoted socialization. Our students love pairing up with other peers to play games in a team format. The students will cheer on one another and be involved in the game as a spectator. Additionally, the floor is used to reinforce content material learning in class. Classroom teachers are able to implement follow up lessons on the floor and provide their students with a fun and interactive way of learning.

Q) Do you have specific examples of areas of improvement?

A) Many of my colleagues have stated that the ActiveFloor has been instrumental in teaching turn taking. Kerrie Clark, a fellow special education teacher states, "Overall the ActiveFloor has helped my class with turn taking and waiting patiently as each student takes a turn. The ActiveFloor has also been instrumental in teaching my students to be part of a team. The students cheer each other on and are learning how to work together in small groups, as team."

Q) Now that you have created games in MyFloor, do you have any new game template suggestions?

A) Folders within folders was a big request among our teachers. I am happy to see that ActiveFloor has now added this feature to the floor.

Additionally, being a teacher at a school that focuses on life skills, I would love to see a sequencing game; a game in which creators can make all different type of sequencing activities. The students would select pictures in order of occurrence, text could be added too for higher level learners who are able to read. The games can be general life skills (brushing teeth, making recipes, etc.), academic (sequencing the life cycle or a butterfly or chicken), or teachers can make sequence strips that are specific to their students (ex: reinforcing the daily schedule of a student, or reinforcing school day events for students) ■

BACK TO CONTENTS

Assistive Technology to Support Emotional Regulation

Summary:

During a student's school years, emotional regulation plays a huge role in how they interact with and form relationships with peers and teachers. It also impacts academic performance, as dysregulation can cause disengagement or removal from the classroom environment. Assistive technology is one way to help support students who struggle with emotional regulation so they can form solid relationships and build academic success. Low and high-tech solutions are readily available to help students regulate their emotions to better engage with their peers and educational experience.

Assistive technology is a key to helping individuals with disabilities access information, tasks, or the world around them. Assistive technology is often considered early as an option for individuals with physical disabilities. However, assistive technology can also be a necessary support for people who struggle with regulating their emotions. During a student's school years, emotional regulation plays a huge role in how they interact with and form relationships with peers and teachers. It also impacts academic performance, as dysregulation can cause disengagement or removal from the classroom environment. Assistive technology is one way to help support students who struggle with emotional regulation so they can form solid relationships and build academic success.

EMOTIONAL REGULATION

Emotional regulation is a term used to describe the way a person manages an emotional experience. When an individual lives through any sort of emotional experience, whether positive or negative, their body reacts in response. This natural reaction occurs within the body to keep the individual experiencing the emotion safe. Emotions help people understand their feelings, guide decision-making, and influence behavior. For example, if a person is surprised, their body might react by increasing the processes that allow the individual to run – the "fight or flight" response.

When a child is young, their body frequently responds to emotional experiences with memorable reactions such as tears, tantrums, or excess excitement. As a child grows and matures, their body and mind learn that specific emotional experiences do not warrant such a large reaction. For example, a broken toy may cause a three-year-old child to melt into tears and sobs, whereas an eight-year-old child may merely look sad and ask for help.

This natural progression of learning how to manage and regulate emotions to better match the experience is an important learned skill. When children are young and learning this skill, they may look towards adults to help them regulate their emotions. This can be through an adult offering calming suggestions or activities, such as giving a hug, taking a walk, or coloring. As a child grows and matures, they begin to be able to regulate their emotions and responses to emotional events independently.

CASSIE FROST, iM.S.Ed, ATP has been in the special education field for eighteen years as a special education teacher, Assistive Technology Professional, and consultant. She has specialized in utilizing technology with students who struggle with emotional and behavioral disabilities, autism, and behaviors resulting from intellectual or learning disabilities. Cassie serves on the WI Assistive Technology Advisory Council, is a RESNA-certified Assistive Technology Professional, and is an ISTE-certified educator. She enjoys working with others to find creative solutions and ways for all students to succeed. She presents at the regional and national levels about technologies that enable student access and engagement.

BACK TO CONTENTS

This self-regulation skill must be learned and practiced in a safe environment. School can be challenging for children who come to school with difficulty self-regulating their emotions, with significant emotional reactions causing struggles with friendships and classroom activities. This can quickly snowball into disruptive behaviors and a continued lack of self-regulation skills, as the school environment may not feel like a safe space to practice and hone the ability to self-regulate.

One of the areas that can affect emotional regulation in school is a student's difficulty with executive functioning skills. Executive functioning is how an individual gets themselves together to do the things they need to do. This includes skills developing skills such as organization, time management, attention, and memory. When students feel overwhelmed, disorganized, struggling to focus, or "running late," it becomes harder for them to regulate their emotional reaction to school situations. Struggles in these areas often result in frustration from peers and teachers, academic struggles, and decreased time to self-regulate. This can lead to more emotional interactions and situations that naturally cause increased emotional reactions, such as confrontations, negative responses from friends, and feelings of being overwhelmed.

When a student is dysregulated, their emotions make it hard to recognize their environment is safe. They are constantly alert for a threat or something that will cause a heightened emotional response. This can increase anxiety, depression, or avoidance, and make students feel uncomfortable in their surroundings.

Dysregulated emotions make it hard for students to respond appropriately to environmental and social cues. Small difficulties may feel huge, and students may act according to how they feel instead of the reality of the situation. To the people around the student, these reactions do not appropriately match the situation and will often appear as disruptive behaviors.

ASSISTIVE TECHNOLOGY AND EMOTIONAL REGULATION

Assistive technology includes tools and supports that help an individual with a disability access their environment. If an item or tool is necessary for a student to maintain emotional regulation, it may be considered assistive technology. Tools supporting emotional regulation are often readily available in a school setting. However, assistive technology or access to the tools may be denied due to the perceived lack of need.

It is important to recognize that tools for emotional regulation exist within the school setting and the environments each of us experience daily. Adults use tools to help self-regulate emotions every day. These tools are so ingrained into daily routines that they are accepted as standard practice and may be overlooked as being assistive technology tools.

Tools for supporting executive functioning, such as lists, timers, and fidgets, are often used to help individuals feel more comfortable with the tasks they need to complete. They are used by adults both in home environments and within the workplace. Techniques such as doodling on paper while on the phone, pacing, and listening to music are often used to help remain regulated while waiting or when nervous. Recognizing the importance of self-regulation tools and how they are already being used outside of the school setting can help educators identify tools that may be appropriate for their classrooms and which may be necessary for students to manage their emotions better.

Assistive technology can help students who do not yet have the skills to independently self-regulate their emotions, find ways to identify them, process a level that is appropriate for the situation, and regain an expected level of emotional regulation. This can improve student success in the classroom and with interpersonal relationships.

LOW TECH VS. HIGH TECH TOOLS

When considering assistive technology for emotional regulations, it is important to consider that there are multiple types of tools that may best meet each student's needs. One important consideration is determining if the student would benefit from a low-tech or high-tech tool. Historically, low-tech solutions were readily available for students who needed a tool to regulate their emotions. For example, doodling on paper was a common technique for students feeling anxious or impatient during class. However, with the increased use of technology in the classroom, in some situations, paper or a pencil to doodle with may not be readily available to a student. Consequently, when we are considering what tools may work best for a student who is struggling with emotional regulation, we need to look at both high and low-tech solutions, becuase the low-tech solutions that may naturally have been used by students in the past, may not be readily available in today's classroom.

Conversely, while we may have considered many high-tech solutions unattainable in the past due to cost constraints, tools such as apps and extensions are now readily available to students who spend a good portion of their day already interacting with computers, Chromebooks, or tablets. It is important to note that in some instances, high-tech solutions may be overwhelming and, in some cases, overstimulating for a student who is already struggling with managing emotions. However, high-tech solutions may be the best option for students who enjoy technology and have access to it throughout their day.

When looking for assistive technology to help students regulate their emotions, looking for features that match each student and their needs will provide you with both high and low-tech tools most appropriate for each student. Consider the features of each tool, including the built-in features of high-tech tools such as timers, durability, sensory input, and volume. Being aware of the tools that students are already using and the features of both low and high-tech solutions will help you find the best options for helping students regulate their emotions.

BACK TO CONTENTS

LOW-TECH TOOLS FOR EMOTIONAL REGULATION,

Low-tech tools for emotional regulation are often readily available and cost-effective when looking for solutions for students. Some examples of low-tech assistive technology for emotional regulation include journals, visuals, communication boards, and fidgets.

Journals

Writing is one-way students can safely reflect on their feelings and emotions. Providing an opportunity for students to write and the tools necessary can help students learn a way to cope with emotions that feel too big to share in any other way. This is a safe way for students to get out their feelings, reflect on the situation that caused the emotions, and problem-solving methods for handling them.

Journals can be as simple as a notebook or can be a structured format, such as a journal designed for processing emotions.

Examples of Journals:

- The Hero's Journal
    - 91-day planner/journal combination that prompts the writer through their day's adventures.
- Big Life Journal
    - This journal is created for children to help them learn about emotional skills through stories and guided writing prompts.

Visuals

When students feel overwhelmed by emotions, it can be difficult to recognize auditory input or remember the methods they have learned to self-regulate. Additionally, students who struggle with executive functioning and overwhelm due to these struggles can often become dysregulated when they forget what they need to be doing. Providing visuals for a student is one way to help them stay organized, remind them of what the expectation is, and help them stay focused on the steps to regulate their emotions.

Examples of Visuals:

- Visual Schedules
    - Providing a schedule to a student can allow them to anticipate what is coming next and help them stay focused when they are beginning to struggle with emotions.
- Time Management Tools
    - Time tools such as clocks and timers can help students understand how long they are expected to stay in an environment or work on a task causing them to feel emotionally escalated. Additionally, the clock can help students plan for regular breaks to check in on their emotions.
- First/Then
    - A First/Then visual shows a student what needs to be done first and what comes after. This can be helpful for a student who has to do something that causes them frustration by helping them see that something that they enjoy is coming next.
- Lists of Options
    - Providing a list of options or regulation techniques for a student to choose from can help them recognize that there are different ways that they can handle their emotions and remind them of tools and techniques that are available to them.
- Reaction Charts
    - A chart that shows common frustrations or emotional triggers and ways that a student can respond in an emotionally regulated manner can be helpful for a student who struggles with disruptive behaviors when emotionally dysregulated. Students can also help create these charts, making it a learning moment.

Communication

Students struggling with emotional regulation may also struggle with finding the words they want to use. Using a communication board can allow students to share their feelings or their message without adding the frustration of trying to think of the words they want to use.

Fidgets

When a student feels anxious or has difficulty managing emotions, movement can be a way to manage these feelings. While, sometimes, gross motor movements such as running, jumping, or stomping may help a student regulate, often, in the classroom, this is not a possibility. Fidgets can allow a student an outlet for movement without significant disruption to the classroom environment.

Examples of Fidgets

- Store Purchased
    - Fidgets are readily available online and in stores. Students often have their own fidgets, such as popping fidgets, spinners, or stress balls.
- Pencil Grips
    - Pencil grips come in a variety of textures, which can provide students with a sensory surface to rub when they are working to manage their emotions.
- Paperclips
    - Linking and unlinking chains of paperclips can be a simple fidget with materials available in almost every classroom.

- Pony beads and Keyrings
    - Threading three pony beads onto a 1" or larger keyring creates a fidget that students can quietly keep in their hand or pocket. The beads slide smoothly around the ring and are inexpensive to make.

HIGH-TECH TOOLS FOR EMOTIONAL REGULATION

High-tech tools have become more readily available for students as they spend more time on devices throughout the day. Teaching students how to use built-in features of devices to help regulate their emotions can be beneficial both in and out of the classroom. As students transition and spend more time outside the classroom, knowing how to use tools available on the technology they use daily can provide life-long support for emotional regulation. Examples of high-tech assistive technology for emotional regulation include extensions, websites, and apps.

Extensions

Extensions are additions to standard internet browsers, including Chrome and Edge. Each extension adds functionality within the browser. While many extensions are free, it is crucial to ensure they are approved for student use when adding them to a district-managed device.

Examples of Extensions

- Momentum
    - Momentum is an extension added to your browser to change the screen that shows each time a new tab is opened. Once Momentum is added, the Momentum screen appears every time a new tab is opened. The Momentum screen shows a background of a natural scene along with a message saying "Good Morning/Afternoon" and has a place for the student to enter their name. The rest of the screen is customizable with places to enter a to-do list, a day's goal, bookmarks, and a daily quote. These features can help a student maintain emotional regulation when working online by providing a calm environment each time a new tab is opened, instead of opening a search browser or other page that may be distracting or overwhelming.
- Move It
    - Movement is one way to help students regulate their emotions. Move It is an extension that regularly prompts students to participate in gross motor movement regularly. Once the extension is added, a time increment of 5-55 minutes is selected. The extension then tracks time and prompts the student to complete a gross motor activity, such as five jumping jacks or toe-touches at the chosen interval. Once the task is complete, the student can close the screen, and the timer will reset automatically.
- Noisli
    - Noisli is an extension that provides background noises, such as rain, wind, and coffee shop. For students who struggle with classroom noises or are having difficulty regulating their emotions, soothing sounds such as rain can help them refocus and regulate their emotions. Noisli can also set a timer for the noises or mix sounds to create a mix that each student prefers.

Websites

Websites are easily accessible regardless of the device being used by the student or classroom. Some websites supporting emotional regulation can work well when projected for the entire classroom. Examples of emotional regulation support that websites can offer include support for noise levels and providing visuals for students.

Examples of Websites

- Bouncy Balls (https://bouncyballs.org/)
    - Bouncy Balls is a free website that provides a volume monitor for the classroom or environment. Once the option to "start bouncing" is selected, balls drop onto the screen. As the microphone picks up noise, the balls bounce higher/more aggressively as the noise level increases. When students are dysregulated, they often do not recognize how loud their voice is. This tool can help students who are dysregulated recognize the level of volume of their reaction.
- Classroom Screen (https://classroomscreen.com/)
    - Classroom Screen is a free website that allows the teacher to provide visual supports easily on a projected screen. The paid version offers saved screens for teachers who want to keep the visuals over multiple uses. When this website is opened, it shows a natural landscape image and options toolbar. When an option is selected, it is added to the screen. Options supporting students with emotional regulation include timers, lists, volume meters, clocks, calendars, and a place to write directions or reminders.

BACK TO CONTENTS

Apps

Apps are programs that can be added to tablets for students to use. There are a variety of apps within different platforms, including Android and iOS. Some examples of apps that can help students manage their emotions include visual schedule apps, breathing apps, and chat apps.

- Choiceworks (iOS- $19.99)
    - Choiceworks is an app that provides visual schedules, complete with customizable pictures of each task. Additionally, the app includes the option to add a timer to tasks and visuals for how to handle emotions. This can help students who need a visual schedule with more options than a low-tech one.
- Pause: Daily Mindfulness (iOS- Free)
    - Pause helps students calm themselves and regulate their emotions through slow movements. This app provides a dot on the screen that moves slowly while prompting the user to keep their finger on it. As the user stays on the dot, it grows larger. If the movement is too fast and the user loses the dot, the dot shrinks in size. This calming slow movement can help students regain or maintain their emotional regulation when they start to feel escalated.
- Breathing Zone (iOS- Free)
    - Breathing Zone is a guided breathing app that prompts students to breathe in and out along with the expansion of the image on the screen. Deep and controlled breathing is a way that many students become aware of their breathing and escalated emotional state and learn to control it.
- Mindful Powers (iOS- Free/Paid)
    - Mindful Powers is a game-style meditation app. It provides instruction on deep breathing and other self-regulation techniques while encouraging users to take care of their pet Flibbertigibbet. Before each lesson, the student must smooth the Flibbertigibbet by slowly petting it with their finger. If the student is too rough or fast, the Flibbertigibbet becomes upset.
- Emergency Chat (Android/iOS- Free)
    - Emergency chat is an app created to help individuals communicate when they struggle with verbal communication. When the app is opened, a customizable message shows on the screen, explaining that the app user cannot communicate verbally at the time but would like to communicate via text. The app provides a simple text-messaging interface where both parties can write to each other on a single device. For students who struggle with managing emotions, being able to use non-verbal communication can be one way to process emotions and self-regulate.

CHOOSING A TOOL

Choosing the tool that may work best for a student when working on self-regulation may be a multi-step process. Once the need is identified, finding tools that provide the needed features and will work in the student's environment when needing support becomes the next priority. While many tools have fun features that many students enjoy, it is essential to look at what specific features help the student regulate their emotions and which tools have these features.

Consider the environment that the student will be using the tool in and which tools will work well within that environment. For example, if a student is using a Chromebook most of the day at school, choosing an iOS app wouldn't make the most sense.

Helping students regulate their emotions using assistive technology will help them better interact with their classroom environment, peers, and teachers. This can help students feel a part of their school community and continue to feel safe practicing the self-regulation skills they are learning. Supporting executive functioning, providing assistive technology, and giving students time and space to regulate their emotions will help students improve their self-regulation skills and decrease behaviors that cause disruptions to the classroom and damage the student's school experience. ■

Using brain computing to maintain access to language with individuals affected by Amyotrophic Lateral Sclerosis (ALS)

Summary:

Overall, the combination of non-invasive Brain-Computer Interface (BCI) technology and the occipital lobe's ability to process visual information can provide a powerful means of communication for patients with severe motor disabilities, such as ALS. BCI has the potential to revolutionize the way we support these patients, allowing them to maximize their interaction with the world around them even as the disease progresses and other accessibility tools, such as eye tracking, fail. Although BCI technology can be particularly beneficial for patients in the later stages of ALS, it has applications in many speech-generating areas of interest which Cognixion is aggressively exploring. Cognixion is excited to become the first SGD manufacturer to produce an FDA-approved BCI device for patients with neuromotor impairments.

Amyotrophic Lateral Sclerosis (ALS) is a progressive and degenerative disease that affects the nerve cells responsible for controlling voluntary muscle movement. As ALS progresses the motor neurons in the brain and spinal cord begin to degenerate, which ultimately leads to the loss of muscle control and function. This neural degeneration can result in difficulties with speaking, swallowing, and breathing. Cognixion has taken on the challenge to provide language and environmental access for late-Stage ALS patients utilizing EEG to control their speech-generating device.

FIRST AND FOREMOST, "WHAT IS ALS?"

Amyotrophic Lateral Sclerosis (ALS), also known as Lou Gehrig's disease, is a progressive and degenerative disease that affects the nerve cells responsible for controlling voluntary muscle movement. As the disease progresses with the individual, the motor neurons in the brain and spinal cord begin to degenerate, which ultimately leads to the loss of muscle control and function. This neural degeneration can result in difficulties with speaking, swallowing, and breathing, and loss of mobility and strength in the limbs.

ALS tends to affect adults between ages 40-75 but can strike at any age with an average age of 55 based upon data from the ALS Association. As many as 600,000 diagnoses of ALS per year worldwide (~30,000 in the US). ALS is a fatal diagnosis with an average life expectancy of 3-5 years after diagnosis. Currently, there is no cure for ALS. Although ALS is devastating to the function of nerves and muscles it does not affect the five senses. In most cases, cognitive functions-solving, and decision-making remain intact.

ANDREAS FORSLAND, CEO, Cognixion. Andreas has extensive experience as a former product, customer experience, and brand leader for Phillips, Citrix, IBM, and Progressive Insurance. Andreas started Cognixion when his mother was in the ICU and was unable to communicate effectively with current technology.

JOHN STANDAL, MS/CCC-SLP, ATP, Vice President of Clinical Affairs, Cognixion. John has been working directly with people with communication and learning impairments since 1993. John has worked with Words+, Viking Software, Tobii, n2y and Specially Designed Education Services in the past.

BACK TO CONTENTS

ALS affects slightly more men than women, with a male-to-female ratio of about 1.5:1. The average life expectancy for people with ALS is two to five years from the time of diagnosis. However, about 10% of people with ALS live for 10 years or more, and some people with the disease can live for several decades. The incidence of ALS is highest in the United States and Europe, and it is rare in other parts of the world. The reason for this geographic variation is not fully understood.

There is no known cause of ALS, but research has identified several potential risk factors, including genetics, environmental factors, and lifestyle factors such as smoking and physical activity.

STAGES OF ALS

How does ALS present itself to individuals or Person's with ALS (pALS). While the end point is the same for all people with ALS, the disease progression varies among all those diagnosed. The muscles affected first are different from person to person. Some individuals progress quickly through the disease process while others may plateau at times, or even revert for brief periods before resuming the ultimate decline.

Because there is no single test that can definitely diagnose ALS, a healthcare provider will conduct a physical exam and review your full medical history. A neurologic examination will test the patient's reflexes, muscle strength, and other responses and will be held at regular intervals to assess whether symptoms such as muscle weakness, muscle wasting, and spasticity are progressively getting worse.

Here are current tests physicians might perform to help diagnose and or rule out ALS from the National Institue of Health (NIH ALS Diagnosis). These usually involve muscle and imaging tests to rule out other diseases and confirm the diagnosis of ALS:

- Electromyography (EMG) is a recording technique that detects electrical activity of muscle fibers and can help diagnose ALS.
- A nerve conduction study (NCS) measures the electrical activity of your nerves and muscles by assessing the nerve's ability to send a signal along the nerve or to the muscle.
- Magnetic resonance imaging (MRI) is a noninvasive procedure that uses a magnetic field and radio waves to produce detailed images of the brain and spinal cord.
- Blood and urine tests may be performed based on your symptoms, test results, and findings from the examination by a doctor. A physician may order these tests to eliminate the possibility of other diseases.
- A muscle biopsy may be performed if your doctor believes you may have a muscle disease other than ALS. Under local anesthesia, a small sample of muscle is removed and sent to the lab for analysis.

EARLY STAGE OF ALS – first region of involvement in the body is noted. In this stage, the patient may experience weakness or twitching in one or more limbs. They may also notice difficulty with fine motor movements, such as writing or buttoning a shirt. The symptoms may be mild and not interfere significantly with daily activities. Noted symptoms can include:

- Muscle weakness, twitches, and cramping, followed by problems with balance, coordination, and gait.
- Increasing effort to breathe, slurred speech, and some difficulty chewing and swallowing.
- Typically, no impact to behavior or cognition
- This is where voice banking may begin but often patients do not fully engage in this process, incorrectly believing they have more time to complete this activity.
- Touch, eye tracking or switch-based computer access may be prescribed.

MIDDLE STAGE OF ALS - at this stage two to three regions of the body are now involved. The symptoms in this stage become more pronounced and begin to affect the patient's ability to perform daily tasks. The weakness spreads to other limbs and muscles, including – often early in the disease - those responsible for speech, swallowing, and breathing. Patients may require assistive devices such as a wheelchair and may also require assistance with daily tasks such as grooming and feeding. Noted symptoms could include;

- Muscles become increasingly paralyzed, atrophied, or permanently constrained.
- A wheelchair and/or respirator are typically prescribed, and constant care is needed for daily activities.
- A small portion of ALS patients may spontaneously laugh or cry (pseudobulbar affect), and nearly 50% show some signs of Aphasia-like language impairments (An Evolving Understanding of ALS with Frontotemporal Degeneration).
- Users will require eye gaze or complex switch access through the entirety of this phase for language/communication or environmental access.
- The end of this stage is typically marked by gastronomic intervention (a feeding tube) as secretion or bolus control becomes problematic.

LATE STAGE OF ALS – The end of life. In the final stage of the disease, the patient is completely dependent on others for care. They may be unable to move, speak, or breathe on their own and may require mechanical ventilation. For the most part, the patient's cognitive function remains intact, but they are unable to act on this cognitive awareness.

- The top causes of death for pALS are respiratory failure, pneumonia, and heart complications (in order).
- Around 30% of patients will exhibit dementia and/or severe aphasia by this stage (An Evolving Understanding of ALS with Frontotemporal Degeneration).
- The Trochlear nerve is often the last to be affected by ALS, so users can use eye gaze to generate communication

through eye-tracking devices as long as the ocular muscles stay intact.
- As the Trochlear nerve becomes affected, because eyesight is still intact, the only solution that remains for patients to communicate is the use of a Brain Controlled Interface (BCI).
- Typically, the end of life is 3-5 years after initial diagnosis, but those diagnosed younger than 50 generally exceed this timeframe, if the patient survives past 5 years PLS (Primary Lateral Sclerosis) would be under consideration.

The disease typically follows a predictable pattern of progression, with symptoms worsening over time. Some patients may progress through the stages more quickly or slowly than others, and the order of symptoms may also vary. However, understanding the stages of ALS can help patients and their caregivers prepare for the changes that may occur and make the necessary adjustments to maintain the patient's quality of life. As ALS progresses individuals move through the stages of the disease at varying rates. In general, the late stage is the shortest in longevity but that is not always a standard expectation.

CURRENT SGD (SPEECH GENERATION DEVICES) ACCESS METHODS FOR PATIENTS WITH ALS

The need for SGD technologies occurs early in the disease due to emergent speech disabilities. Initially, ALS patients may face intelligibility issues for their speech, and subsequently, they may have no functional speech and require speech-generating devices to communicate at all. Dysarthria occurs in more than 80% of ALS patients and is seen earlier in those with bulbar onset who may become anarthric after a few months of disease onset. Approximately 80% of ALS patients utilize some form of SGD device, and on average, rely upon it for 2-3 years. Most move from a direct select access (i.e., typing) to possibly a finger drag typing style and then usually end up using eye-tracking as their main access method. Eye tracking computer systems (ETCS) can allow cursor control by eye movement and represent a current standard of care. As stated previously, eye movements can be less fatiguing and at later stages of the disease can be the only remaining volitional movements that allow patients to communicate.

Currently, clients with ALS use the following access methods to their Speech Generating Devices (SGD); touchscreen, switch interfaces, eye tracking and/or head mouse, these access methods have been used with limited success with many late-stage pALS. In isolation and at the appropriate stage, access can be successful, but as the disease progresses, the ability to transition from access method to access method is always needed.

The largest void of AAC (Augmentative and Alternative Communication) access for people with ALS is at the late stage or closer to the end of life. At this stage, even eye tracking becomes difficult if not impossible due to the disease progression and/or ocular comorbidities. In a study looking at ALS patients and abnormal eye movements anywhere from 60-70% of ALS patients were reported to have ocular issues. (Eye Movement Abnormalities in Amyotrophic Lateral Sclerosis in a Tunisian Cohort)

Because the eyes and forehead are bilaterally innervated, they are usually the last reliable access method for people with ALS. In short, bilateral innervation means that relatively equal distributions of right and left-brain hemisphere innervation govern the function of a specific facial part (such as the eye muscles). The 7 extraocular muscles, even though bilaterally innervated, are small and thus fatigue quickly causing the AAC user to have false positive selections when eye tracking. Research has shown that it is reasonable that with bulbar disabilities, eye movement abnormalities should be considered (Eye Movement Abnormalities in ALS) and may need to be addressed with disease progression.

SGD ACCESS METHODS AND PROS AND CONS RELATED TO ALS

Access Method	Pros	Cons	Stage of ALS
Touchscreen	Immediate access to their language/ AAC device.	Positioning of device for access and ability to isolate their fingers causing false positive selections.	Used in early stage of ALS
Switch interface	Ability to access different areas of the body depending on muscle control	Slow access to language and access, higher incident of false positive strikes. Very slow access to language.	Used in middle and late stage of ALS
Eye Tracking	Eyes remain intact until late stage of ALS but will eventually fail as an access point	Calibration issued and positioning of device, direct sunlight washing out cameras	Used in mid stage and late of ALS
Head Mouse	Allows for direct select access with gross movement of head movement	For most ALS patients the ability to maintain good head movement and/or positioning degrades early in the disease progression	Used in early to middle stage of ALS

WHAT IS A BRAIN CONTROLLED INTERFACE (BCI)?

In short, a Brain-Computer Interface (BCI) is a system that enables communication and control between the brain and an external device, such as a computer, without requiring any physical movement or action. BCI technology typically involves the use of sensors (electroencephalogram = EEG's) to detect and interpret neural activity, which is then translated into commands

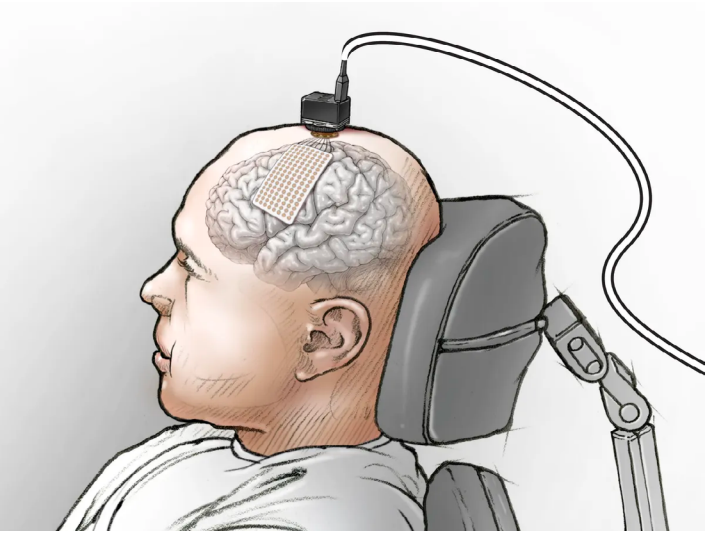
BACK TO CONTENTS

that can be used to control external devices. BCI's can be external or internal to the brain and both options present their own strengths and limitations.

INVASIVE V. NON-INVASIVE BCI

The benefit of an invasive approach collects brain signals which have the benefit of providing high-quality (stronger) signals but have the disadvantage of requiring surgical implantation of a probe under the scalp with a permanent connection point outside the brain. While the resulting signals provide more accurate readings of brain signals, there is the high cost of the procedure and the risk of infection, as well as the possibility that scar tissues may form which can reduce the effectiveness of the probe.

In a paper from the New England Journal of Medicine, "Neuroprosthesis for Decoding Speech in a Paralyzed Person with Anarthria" ((https://www.nejm.org/doi/full), scientists were able to demonstrate positive results for language formulation with an invasive BCI procedure. The results they reported from their study included the ability of the patients to decode sentences via cortical activity in real-time at a median rate of 15.2 words per minute, with a median word error rate of 25.6%. In post hoc analyses, they detected 98% of the attempts by the participant to produce individual words, and they were able to classify words with 47.1% accuracy using cortical signals that were stable throughout the 81-week study period. Although these types of invasive clinical studies are starting to show positive results, the real-world applications of this technology are still limited to lab-based environments.



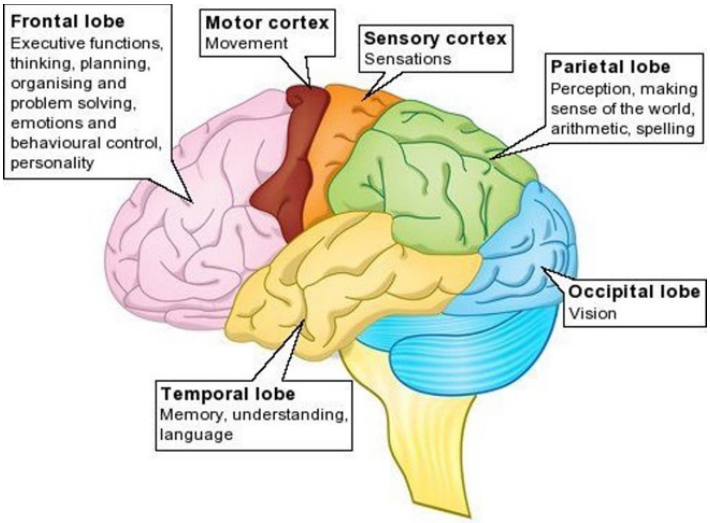
In this illustration, shows an implantable EEG shows the placement of the electrocorticography electrode on the participant's speech motor cortex and the head stages used to connect the electrode to the computer.

Currently, more companies and researchers are relying on non-invasive types of brain signal sensing (EEG). EEG is a non-invasive method for measurement and recording of the electrical activity of the brain with no surgical intervention. EEG is typically performed using small sensors, called electrodes, that are placed against the scalp to receive signals from the brain. Electrodes might be used "dry" (without gel), or signal collection can be enhanced using a special paste or gel between the scalp and electrode. As shown below, the electrodes can be placed anywhere on the head to allow researchers to monitor brain activity and utilize those outputs to view anything thing from affective states to motor functioning to mental fixation (and many more).

Using this EEG data BCI technology can provide an alternative means of communication and control for patients with ALS, especially late-stage. By using sensors to detect neural activity in the brain from the occipital lobe, BCI systems can interpret the patient's intentions and translate them into commands that can be used to control external devices, such as a speech-generating device (SGD), environmental controls, or robotic devices.

The occipital lobe (see Figure 1) is the brain region responsible for processing visual information. In the context of BCIs (Brain Computer Interfaces) for patients with ALS, the patient is presented with visual stimuli on a screen or other display. These visual stimuli can be placed in conjunction with words or commands that the patient may wish to communicate.

Figure 1: The occipital lobe



These visual signals create corresponding electrical signals in the patient's occipital lobe "visual evoked potentials" (SSVEPs) which are then identified via EEG. SSVEP (Steady State Visual Evoked Potentials) stands for Steady-State Visually Evoked Potential, it is a type of brainwave activity that occurs in response to visual flickering stimuli at a specific frequency. SSVEP is a common non-invasive method used in current neuroscience and cognitive research to study visual processing and attention.

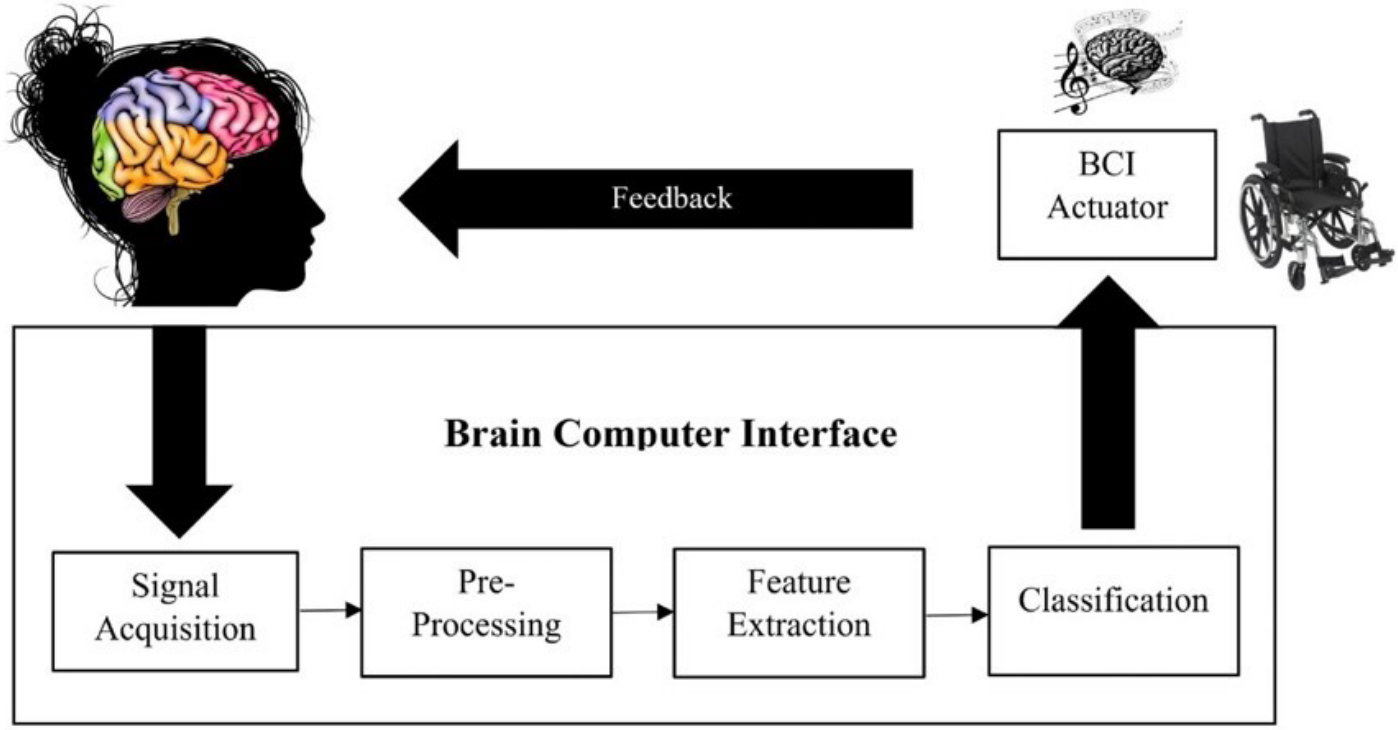
SSVEPs are electrical signals that are generated in the occipital lobe in response to visual stimuli. By presenting the ALS patient with a sequence of letters or words on a screen and monitoring the SSVEPs that are generated in response, the BCI can determine which letter or word the patient is thinking of or mentally fixating on. With this technology, it is now possible to use SSVEPs to detect and interpret the patient's intentions; this access method will be discussed later in this article.

ANATOMY OF BCI

Overall, the anatomy of a BCI is complex and involves multiple components that need to work together seamlessly to provide a reliable and effective means of communication or control of an external device. BCI systems involve a combination of hardware and software components. The image below demonstrates the process and how these systems work together to identify a person's visual intentions and how they are captured and then turned into a language output system.

The anatomy of a BCI can be broken down into several key parts, including:

- Brain signal acquisition: This component involves the use of sensors or electrodes to capture signals from the brain. There are several types of sensors that can be used for this purpose, including electroencephalography (EEG), magnetoencephalography (MEG), and functional magnetic resonance imaging (fMRI).
- Signal processing: The signals captured by the sensors need to be processed and analyzed in order to extract meaningful information. Signal processing algorithms can be used to filter out noise, enhance signal quality, and extract features that are relevant to the task at hand.
- Feature extraction and selection: This component involves the identification of specific features or patterns in the brain signals that are relevant to the intended application of the BCI. For example, in a BCI designed for communi-



Anatomy of a BCI (Brain Computer Interface)

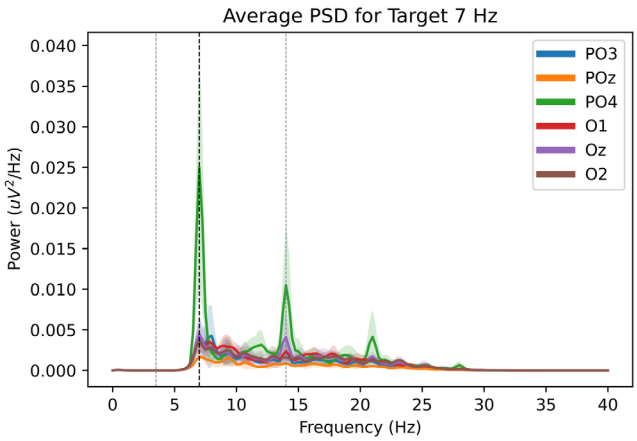
BACK TO CONTENTS

cation, the relevant features might be associated with the intention to move a specific muscle or focus attention on a particular visual stimulus.

- Classification: Classification is the technical term to describe the way machines (i.e., computers) group things into meaningful categories. Once the relevant features have been identified, a classifier can be trained to recognize and interpret them. Machine learning algorithms are commonly used for this purpose and can be trained to recognize specific patterns in the data that correspond to different intended actions or states.
- Feedback and control: The final component of a BCI is the feedback and control mechanism. This involves providing feedback to the user based on their brain signals and using those signals to control a device or perform a specific action. The feedback can take the form of visual, auditory, or tactile cues, and the control mechanism can be anything from a robotic arm to a computer cursor, virtual keyboard or AAC (Augmentative and Alternative Communication) device.

This complete BCI feedback system translates the patient's intentions into commands that can be used to select the desired letter, word, phrase, or access command on the screen. A brain-controlled interface can allow the patient to communicate without the need for physical movement or speech, which can be difficult if not impossible for patients with advanced ALS.

BCI technology works when a person views a visual flashing stimulus, such as a flickering light, the brain generates electrical activity that can be detected using occipital lobe electroencephalography (EEG). In the case of SSVEP, the stimulus flickers at a fixed frequency, typically between 5 and 60 Hz. The brain's electrical activity synchronizes with the frequency of the stimulus, resulting in a characteristic pattern of brainwave oscillations at that frequency. These responses can be detected as distinct peaks or frequency components in the EEG signal. By analyzing the amplitude, phase, and other characteristics of these components pALS will then be able to activate language options or other Internet of things (IoT). Below is an example of a participant from a Cognixion study being exposed to a stimulus at 7Hz and responding accurately via EEG.



Historically, SSVEPs have had a wide range of applications dedicated to laboratory settings. They are commonly used in neuroscience research to investigate visual perception, attention, and cognitive processes. It has also found applications in brain-computer interfaces (BCIs), where users can control external devices or interact with computer systems using their brain activity. The robust and reliable nature of SSVEP responses makes them useful for designing efficient and accurate BCIs.

THE FUTURE IS NOW FOR SGD'S AND BCI

Cognixion has taken on the challenge to provide patients with ALS (pALS) with access to language throughout the disease progression with pure BCI access. With many pALS, their access to their SGD via eye tracking, switch, or touch becomes difficult if not impossible due to the progression in the late stages. This is not due to the lack of technical success of their current technology but more of an issue with lack of bodily access, again their eye gaze failing.

BCI access is a quite different access method than eye tracking. With eye tracking, one must physically look and track towards the desired stimuli using the eye and the camera system of the tracking system (with some desired acceptance input such as a "dwell" option). With BCI as an access method, one must visually gaze (mentally fixate) at the flashing stimuli, thus triggering the SSVEP. This mental fixation will then activate the desired acceptance of what the individual is accessing.

With electrodes attached to the occipital lobe, Cognixion's BCI SGD with EEG stimuli presented can associate letters, words, phrases, or symbols to language (see below). This means that stimuli will be presented to the person allowing them to mentally fixate on letters, numbers, words and/or phrases allowing them to continue to communicate when other access methods have failed. This innovative system will allow individuals with an inability to functionally eye-track to still have access to language (see image below).

TRAINING AND RETRAINING

BCIs often require some form of training and retraining for the user. For example, in a BCI designed for communication, the user may need to undergo training to learn how to control

BACK TO CONTENTS

their brain signals in a consistent and reliable manner. This may involve practicing specific mental tasks, such as imagining the movement of a particular body part or paying attention to one (and only one) of multiple visual stimuli.

In some cases, the BCI itself may also need to be retrained. This may involve updating the signal processing algorithms or adjusting the classification model to better accommodate changes in the user's brain signals. For example, if the user experiences changes in their brain activity due to medication or other factors, the BCI may need to be retrained to recognize and interpret these changes accurately. Additionally, brain signals used to control the BCI may change over time, and the BCI must adapt to these changes to maintain accuracy and reliability. Retraining can take various forms, depending on the specific BCI and the intended application.

Overall, retraining is an important aspect of BCI development and use and plays a critical role in ensuring that BCIs remain effective and reliable over time. By incorporating strategies for retraining and adaptation into the design of BCIs, researchers and clinicians can help to maximize their potential to improve the lives of individuals with neurological conditions or injuries. With this powerful technology the need for retraining is needed to ensure the highest level of accuracy for word or phrase selection.

REFERENCES:

Arwa Rekik, Saloua Mrabet, Imen Kacem, Amina Nasri, Mouna Ben Djebara, Amina Gargouri, and Riadh Gouider

Eye Movement Abnormalities in Amyotrophic Lateral Sclerosis in a Tunisian Cohort https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9291663/

Xintong Guo, Xiaoxuan Liu,Shan Ye, Xiangyi Liu, Xu Yang, and Dongsheng Fan

Eye Movement Abnormalities in Amyotrophic Lateral Sclerosis

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9026966

David A. Moses, Ph.D., Sean L. Metzger, M.S., Jessie R. Liu, B.S., Gopala K. Anumanchipalli, Ph.D., Joseph G. Makin, Ph.D., Pengfei F. Sun, Ph.D., Josh Chartier, Ph.D., Maximilian E. Dougherty, B.A., Patricia M. Liu, M.A., Gary M. Abrams, M.D., Adelyn Tu-Chan, D.O., Karunesh Ganguly, M.D., Ph.D., et al.

Neuroprosthesis for Decoding Speech in a Paralyzed Person with Anarthria

https://www.nejm.org/doi/full ■

BACK TO CONTENTS

product spotlight

Swim Possible – Feel What You Can Do

SwimPossible provides safe, calming, and fun lessons that are customized for students who need a personalized approach – adapted to their needs for learning how to swim. Our method incorporates current swim techniques and adaptive learning strategies to help swimmers quiet their minds and feel how their bodies move in the water.

SwimPossible does not focus on diagnoses or labels. We teach swimming to students of all ages who are not served successfully by traditional group lessons, including those with Autism Spectrum Disorder, Anxiety, ADHD, Down Syndrome, Cerebral Palsy, and other sensory and physical/motor learning differences.

Adapted to you
1:1 adaptive lessons

We offer 30 minute private lessons once a week adapted to your needs and ability. We do offer 1 hour lesson options (when available) for those who need extra transition time. We also offer 10% off for each family member after your first swimmer in the water.

If you have swim lesson needs not met by other conventional lessons, SwimPossible is the place to be! We don't go by structured levels and instead base our lessons simply around your abilities, goals, and needs to provide you with water safety and swim skills in the water.

LEARN MORE

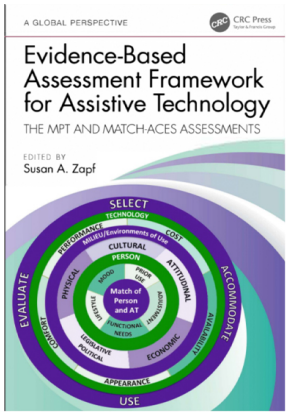
GoTalk Everywhere

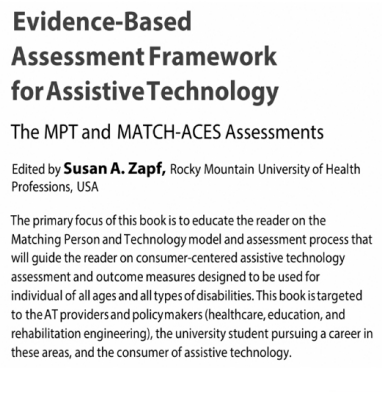
GoTalk Everywhere is the newest addition to the GoTalk lineup. This augmentative communication app is multiplatform and can be accessed on iOS and Android, both tablets and phones! There's also support for Chromebooks, making it a great fit for school settings. This new app utilizes the power of the cloud to sync communication pages between your devices too; pages created on one device will work seamlessly on another. SLPs, teachers, and family members can create AAC pages on the web and send them directly to their clients, students, and loved ones. All your AAC basics are covered: text-to-speech, voice recording, grid layouts, symbols, and you can import your

own photos! Your communication can be adapted anywhere. GoTalk Everywhere!

LEARN MORE

Evidence-Based Assessment Framework for Assistive Technology





The primary focus of this book is to educate the reader on the Matching Person and Technology (MPT) model and assessment process that will guide the reader on consumer-centered assistive technology assessment and outcome measures designed to be used for individuals of all ages and all types of disabilities. The first section of the book introduces the MPT and Matching Assistive Technology and CHild (MATCH) assessment process and discusses key documents that align with the assessments including the International Classification of Functioning, Disability, and Health and the Occupational Therapy Framework III.

The second section of the book focuses on the international emphasis of the MPT and MATCH assessments. At present, there are eight countries that are represented in this section. Each chapter includes information on the assessment translations (with access to copies if available or at least access on how to obtain copies). The authors discuss research on the use of the assessment within their country to support the assessment use. Lastly, a case scenario is discussed in each chapter to provide the reader with an example of how the assessment was used with an actual consumer. The last section of the book includes a focus on outcome studies in the areas of early childhood, education (primary secondary, and postsecondary), work, and functional independence. This section provides the reader insight into how to outline outcome measures within the MPT and MATCH process. There is an additional section on future works that includes a brief introduction to the Service Animal Adaptive Intervention Assessment.

LEARN MORE

ArithmeType

If your student is struggling to complete math assignments because writing is difficult, then the ArithmeType keyboard, app, and website will help to simplify this process. The hardware keyboard conveniently locates the numbers, operations, common math letters and symbols in one plug-and-play device that works alongside your own computer. The output of math is therefore more fluid compared to a standard QWERTY keyboard. Our new iOS app launched in June and replicates the hardware keyboard. It makes keys easy to find and uses popups to avoid confusing screen changes. In addition, math formatting pages help with the proper alignment necessary to show mathematics work, which can be difficult to do on a blank document. We hope the keyboards and math pages will greatly enhance the mathematics output that so many learners struggle with. At ArithmeType our goal is to give all students the power of typing math simply.

LEARN MORE

BACK TO CONTENTS