



MOBILE DEVICES & COMMUNICATION APPS

An AAC-RERC White Paper

The Rehabilitation Engineering Research Center on Communication Enhancement (AAC-RERC) offers this paper as a means for raising issues related to mobile technologies and AAC Apps and to encourage discussion and collaboration among AAC stakeholders. In order to gather information in a timely manner, we interviewed more than 25 AAC “thought leaders” between January and March, 2011, representing multiple stakeholder groups. Interviews were conducted by phone, e-mail and Skype. We acknowledge that our input is limited and that change occurs daily. This white paper and additional information are available at www.aac-lerc.com.

www.aac-lerc.com



This work has been supported in part by the National Institute on Disability and Rehabilitation Research (NIDRR) under Grant H133E080011.

Introduction

The proliferation of inexpensive mobile technology is dramatically changing the landscape for individuals with complex communication needs (CCN). From touch screen phones to tablet devices, mobile computing power and user-friendly interfaces have never been cheaper or more universally available. Apple sold over 15 million iPads in less than a year and the second generation device has already arrived. While other manufacturers are introducing their own tablets and operating systems, Apple's brand loyalty, iTunes store, and design savvy have provided a strong jump on the market. These mobile technologies are multi-media, mass market entertainment platforms. Software applications, or "Apps" as they are commonly known, create ubiquitous devices constrained only by a developer's imagination. Businesses were early adopters for their sales force, and tablets are now increasingly common in education, the hospitality industry and hospitals. Mobile technologies are also being readily adopted by people with disabilities, including those with CCN. We offer a brief historical perspective and informed view on the direction of augmentative and alternative communication (AAC) services and technologies in the new world of mobile devices.

The Roots of AAC

AAC grew from the most basic desire to help individuals with CCN express themselves to the people around them. In its earliest form, AAC included letter and eye-gaze displays and analog communication devices. These devices primarily supported face-to-face interactions and tended to be slow. As microprocessor technology evolved, dedicated AAC systems were custom built in research labs and home workshops, and soon mass produced by a small but devoted AAC industry. These devices were designed to meet the speaking and writing needs of individuals with a range of developmental and acquired conditions. They incorporated important access accommodations and introduced rate enhancement software and synthetic speech options. Concurrently, a clinical delivery system emerged to support individuals with CCN and their communication partners during the assessment, selection, follow up and training process, and to help with advocacy and funding of AAC technologies.

Eventually the personal computer (PC) and standard operating systems became another viable option for AAC technologies. This opened up a new world for developers and others working in AAC, causing a shift in the AAC industry. Companies providing AAC offered mass market consumer platforms with communication software in their product lines, while others built custom cases around standard operating systems. Individuals with CCN now had more options. They could use speech generating devices (SGDs) for face-to-face interactions, as well as to write, create and give presentations, and increasingly participate in their schools, homes, worksites and communities using mainstream software and through the Internet. PC-based AAC devices made all these features more portable. At the same time, medical insurance companies (Medicare/Medicaid) undertook to fund AAC devices under the direction of a licensed SLP, and AAC devices could be recommended as part of a child's IEP or comprehensive healthcare plan.

Emergence of Mobile Devices

Another major shift is occurring today. Mobile touchscreen devices cost much less, are readily available, and there is clearly a “cool” factor walking or rolling down the street, mobile device in hand reading, communicating, or surfing for a Starbucks. Mobile technologies offer a broad spectrum of communication options as well as other functions. Not only have the devices themselves become smaller and multi-functional, but the number of communication Apps and tablet platforms is increasing more rapidly than AAC hardware or software ever did. At this writing there are easily a hundred or more Apps that can meet the needs of some individuals with CCN.

As a more affordable addition or alternative to PC-based AAC devices, mobile devices provide a much larger market of consumers who can afford AAC technologies, compared to users who may have relied on third party funding for their SGDs. Some families no longer need to wait on lengthy insurance reviews, denials and appeals to determine eligibility. And like the shift to PCs before, mobile devices offer a universe of non-AAC applications such books, photos, games, movies, music, the Internet, and educational and personal productivity software, among others.

What’s at Stake?

Our purpose is to acknowledge the rapidity and unpredictable nature of how AAC Apps are being developed, as well as the viral pace at which access to mobile technology is spreading. We also present considerations for stakeholders as this tsunami of AAC development occurs. These stakeholders include end users and their families, peers, service providers, researchers, policy makers and funders, developers, educators, employers and the AAC industry.

We have made certain assumptions. We assume that the advent of these technologies and Apps already is affecting the choices that people with CCN, families, clinicians, school districts and hospitals are making, as well as how the AAC industry is conducting business. We assume that, in the future, there may even be changes in our funding policies and how services are delivered. We assume a long-term seismic shift in AAC is underway, but of course only time will tell.

We also assume that people with CCN have a need for, and right to, the same range of communication options available to everyone else. The very nature of communication has changed. Today, most people use multiple devices to address their daily communication needs. The idea that ANY one device can (or should) “do the job” for individuals with CCN no longer makes sense. Many people with CCN, across the age span, require multiple technology options. Some of their needs may be met by mainstream technologies, while others may require accessories and techniques designed specifically for them (e.g., eye gaze and scanning access, non-glare screens, adapted keyboards, software that supports language

and literacy development and so on). Keeping in mind that universal design is a key goal, not all consumer products accommodate the needs of all persons.

Finally, we assume that we have an urgent, unmet need for quality research and development. There is limited evidence that demonstrates the efficacy of mobile technologies and AAC Apps on the functional communication and quality of life of people with CCN. Who uses mobile devices? Which ones? For what purposes? Where? Why? How often? How does the availability of low-cost, highly portable, multi-use devices change the traditional AAC intervention process? What clinical and technical supports need to be in place; who needs to be involved; what, if any, standards are needed; and how does all this impact clinicians, end users and AAC manufacturers? Finally, what design specifications should be incorporated in Apps for people with CCN whose communication needs are poorly met by current AAC technology and applications? These are some of the questions, among others, we need to explore.

Perspectives from the Field

Asked to encapsulate the transformation taking place, many referenced the advantages of having affordable, multi-function, mobile devices and downloadable communication Apps. “If you build it they will come,” as Kevin Costner hears in the movie *Field of Dreams*. These mobile, multiple use technologies promise diverse opportunities that extend far beyond the capacity of current AAC devices and at significantly lower cost. Also, because the general public is becoming more aware of AAC, more people may now consider what AAC can do for them or a family member. For those who felt traditional AAC technology was too large, too heavy, too costly, and too difficult to learn, these new Apps on familiar platforms are a particularly welcome innovation.

However, what may be perceived as progress is not without cost. For consumers, lower costs and Internet-delivered information are driving many AAC purchases; and hoped for communication goals may not be realized. Downsides may include loss of technical support, lack of quality control, less customization, costs in monthly service agreements and abandonment if devices do not live up to expectations. Access for people with motor or sensory impairments remains unresolved in the mobile world. The digital divide has widened yet again for those who cannot afford to purchase mobile technologies and communication Apps. These central themes, as well as retention of clinical-based decision making are explored in more detail below as are other potential impacts on the AAC field.

Consumer Issues

Mobile devices with communication Apps may be very appealing to individuals with CCN and their families for several reasons. “Normalization” of tablets or other mobile devices has taken the mystique out of AAC. AAC is likely to penetrate a much larger market, for example someone who has temporarily lost her ability to speak. Also these new tablets and

communication Apps may appeal to families of very young children, individuals with autism and others who may not traditionally have thought about AAC. AAC may also become an option sooner, because of the affordability and the accessibility of communication Apps. Also, because these technologies are multi-functional, their appeal is enhanced because they offer ongoing access to information, social interactions, entertainment, music and games.

Perhaps most important, people with CCN are becoming more active consumers, something many in the field have long advocated. We see the “democratization of AAC technology” in the making. Mobile devices are relatively inexpensive and widely available through retail outlets or on-line; Apps are low cost and easily acquired; the mobile platform can support Apps for other uses besides communication; and social acceptance is high as using a mobile device has become relatively unobtrusive. Handling devices before purchase is easy (“try and buy”), as is the learning curve of most platforms. Finally, individuals with CCN should have the same affordable connectivity and communication available anywhere and at any time that others enjoy.

Although this paints a mostly rosy picture, access remains unresolved for individuals with motor and sensory impairments who cannot use touch screen interfaces. There are also concerns about people with language and cognitive limitations. And for those who make their own purchases, the complexity of the communication process or how to support the development of language and communication skills might not be as clear. Currently, educational and technical support for these products is still in its infancy, although on-line communities are beginning to rapidly fill this space.

People with CCN are a diverse group. Individuals range from the very young to the very old, with a variety of diagnoses, life experiences, skills, abilities and preferences. Some may require AAC technologies for a short time only, while others need communication technologies throughout their lives. People with degenerative conditions like amyotrophic lateral sclerosis (ALS) often have rapidly changing communication needs and technology solutions must quickly accommodate these changes.

To help frame a discussion about how and for whom mobile devices and communication Apps are useful and why, consider these varied scenarios that we heard during our interviews. Mobile technologies and communication Apps may:

- Meet most of an individual’s communication needs, serving as the person’s primary communication system;
- Meet some of an individual’s communication needs, serving as one of several communication tools. For example, an iPhone is used as a backup system when the person’s SGD is unavailable or when going out with friends to a movie;
- Be used primarily for training, helping to develop skills related to effective communication. For example language or literacy Apps;

- Not directly address an individual's communication needs, but the individual or family has a mobile device (iPad, for example) and is using it for purposes unrelated to communication. [Note: this can foster interactions with peers, affecting communication opportunities in positive ways]; or
- Not be an option because the individual is unable to access the device, is unable to afford it, or does not wish to use it.

Service Delivery Issues

There is clear agreement among *all* AAC stakeholders that successful communication across partners and settings in ways that positively affect individuals' quality of life is the goal, not the technology itself. As such, AAC professionals wish to retain the desirable characteristics of a thoughtful decision-making process that considers the strengths and communication needs of an individual and then matches the personal characteristics and goals of the person to features of existing technologies, software and accessories. Traditionally, an individual with CCN is scheduled for an AAC assessment, beginning a decision-making process wherein a team of professionals, family members and the individual identifies unmet communication needs and goals. When technologies are deemed part of an education or treatment plan, a speech-language pathologist writes a report to request funding for recommended equipment (SGD and accessories). Included in the process is consideration of training, technical support and follow up.

With mobile technologies and Apps, individuals with CCN or family members are sometimes making decisions based on what they have seen, heard or read. So, in many ways, the new mobile technology is driving service delivery. Often a device and Apps are selected before the clinician is even seen. This can be a challenge in optimizing communication solutions while finding ways to make use of the purchase decision by the family or user. At times there is a mismatch between communication goals and technology, notably when a device has been purchased for capabilities and Apps (e.g., game applications) not directly related to communication or when access is too difficult. As with previous shifts in AAC technology, some AAC professionals feel concerned about their ability to keep up with the technology and the rapid proliferation of communication Apps, as well as perhaps a premature movement away from more familiar dedicated AAC systems.

AAC professionals do not want to lose a rich history of research informing practice. They also want to see evidence-based information integrated into the design of communication Apps and user interfaces. Professionals are concerned over the lack of reliable information, reputable reviews and critiques of Apps. A central clearinghouse, database or intelligent system could help optimize what is currently available with the user's needs and capabilities. Other key questions for the service provider include where will training, funding support, and follow up come from in a mobile device world?

The AAC service provider does not want to be an obstacle in consumers acquiring needed technology. The desire is to keep needs and capabilities of the user in mind, listen to consumer preferences, and recognize and support the grassroots movement that has developed around mobile devices. As of today, however, the current service delivery system is ill-prepared for the pace of this transition. We recognize that the clinician-based model is costly and has developed over many years, but it may no longer be the only model and perhaps, in some cases, may not prove to be the best model.

AAC Industry Issues

In most cases, dedicated AAC devices do not have the computing power or cutting edge technology of mainstream computer devices. AAC manufacturers maintained their market niche by providing specialized, integrated AAC applications, assisting with the device selection process, and providing funding, training and technical supports. Certain factors have driven the AAC industry since its inception and the costs of SGDs today is due in large part to costs associated with research and development, a distribution system that offers training, technical support and service, and low volume sales.

In addition to concerns about existing delivery models, there is concern over the future of the AAC industry and its current business model. Design features seen in mobile devices and availability of communication Apps are outpacing the AAC industry's response. Profitable hardware-based communication systems, the bread and butter of AAC manufacturers, are being challenged by very low cost software running on universally available mobile platforms. Although it is still early in the cycle, many fear that the industry is falling behind, and a new business model is needed. The threat may be greatest to hardware providers. Consolidation, as often occurs in many technology shifts, is a real possibility.

For some individuals who need complex features to access AAC technologies, there will always be a place for dedicated AAC devices and accessories, such as switches, speakers, cases, mounts, and other interfaces to communicate effectively. However, this alone might not sustain the AAC industry. Also, there will still be a need for research and development, and a need for providing technical support and training. AAC manufacturers may figure out a better and easier distribution system for their products and services, as well as how to provide technical support and consultation to AAC stakeholders.

Development Issues

Apple's early entry, branding and dominant market share have for now captured the consumer market. What we are observing is clearly a technology-push where manufacturers and developers create products that users never knew they needed. ("There is an App for that."). With the easiest and most accessible distribution system, the iPad is the platform of choice until other manufacturers demonstrate otherwise. One platform driving most Apps and distribution has advantages and disadvantages. However, as with mobile phones, we

have seen competing platforms and operating systems emerge and should expect a similar occurrence in the AAC market.

Many opportunities exist for developers who understand the technology and consumers' needs. Underlying success are issues related to customization, learnability, durability and technical and training supports. We heard that lack of standards is a significant concern; for example with interfaces, interconnectivity among devices, and Apps that can work across platforms. Many told us that current Apps are unimaginative, we need to "get out of the box," and that more customization is needed. There are challenges with mobile devices themselves, such as glare, ruggedness, sound, and system back-up, and reminders that some people with CCN will always need unique features that mainstream companies will not address. App development likely will remain bottom up (i.e., by engineers, parents, tinkerers, AAC professionals, etc.). However, it is important that clinical, technical and advocacy communities work together to create systems that are not just affordable, but also achieve the real and functional communication goals for persons with CCN and enhance their quality of life.

Research Issues

This is clearly a great time to be an AAC researcher. Areas of further exploration for mobile devices and communication Apps include identifying human factors related to design and access for people with CCN; social issues such as usability, integration and discontinuance; technology compatibility; sensory and cognitive demand; and clinical issues including feature matching, language use, literacy, etc.

Longitudinal research using single cases and describing use across populations might address ethnographic questions, quality of life issues, preferences and usage over time. There is also a growing need to evaluate what exists and compare features across mobile devices and communication Apps. Examples of individuals with CCN who are using mobile devices and AAC Apps are emerging, but often on YouTube, as part of a marketing campaign and testimonials. We know little about how individuals are using mobile devices and communication Apps.

During the interviews, we heard about "early AAC adopters" of mobile technologies. These individuals are literate, enthusiastic technology users who report using mobile devices and Apps as one component of their communication arsenal. Cell phones, Smart phones with the iOs and Android platform, iPad, iTouch, and Kindle enable these individuals with CCN to text, email, access the Internet, write, work, listen to music, frequent social network sites, read, tweet, blog and play games. They also use these devices as reminders, locators, organizational supports and so on. Most also have and use one or more SGDs.

We should not move away from the use of participatory action research (PAR), which is person-focused and gathers evidence about communication effectiveness in real environments. Defining successful outcomes is no different than with previous AAC technologies. PAR can further enlighten the field about how and when mobile AAC technologies can contribute to successful communication, for whom and under what circumstances. Basic research questions about communication processes and AAC continue to require research attention, as communication options continue to expand, even as we are enamored with the mobile technology.

Advocacy Issues

While stakeholders in the AAC field play a particular role (clinician, developer, researcher, manufacturer, educator, user, family member), many are also “advocates,” concerned with not only their ‘place’ but the provision of appropriate AAC services to all who need them.

A model based on consumer access to technology and information is clearly the biggest outcome of the mobile device transformation. In the clinician-based model, service providers and sales reps were often gate keepers to AAC systems. Now consumers have direct access to devices and information, and due to lower costs also have purchasing power. There is a grassroots consumer empowerment movement far stronger than when the shift to PC’s and laptops occurred.

Undoubtedly companies like Apple and the media they use to sell more products are fueling consumer demand. Mobile technologies and Apps have created AAC tools that many more AAC users can afford. However, for individuals and families who cannot purchase their own systems, we remain at the earliest stages of third party funding. How insurance companies, government programs and industry will respond is unclear. Perhaps the clinical assessment, training, and follow up are funded, but the mobile device is not; or maybe funders limit the choices of mobile devices or frequency of purchase. Device discontinuance and rapid replacement with newer models could undermine third party funding. We can expect test cases with insurance companies as well as grass roots support for improved reimbursement.

Privacy and security issues remain unresolved as AAC users share more personal information wirelessly through their devices. There is also a need for technical support, which at present is mostly served through on-line communities. The technology is changing rapidly and as with any product, the consumer is at a disadvantage to the manufacturer. Advocates can work alongside AAC professionals and industry to reinforce the difference between the mobile device and true communication tools.

Summary

The goal of augmentative and alternative communication has always been about communication, not the device or technology. For anyone who uses technology as a tool, we never feel caught up or that we know enough. Persons who use AAC and AAC professionals are no different. The pace of technology change is more rapid than ever before, and the same will be said a year from now. We are indeed in uncharted waters. The field needs to respond; in some cases provide guidance, and in others determine a new role. We need to maintain professionalism during this change; partnering will serve the AAC professional better than resistance.

Isn't improved access to communication (i.e., greater availability, lower cost, universal acceptance) what AAC providers and users have been asking for all along? We don't want to dismantle the current system, which supports consumers with products that meet their needs. Yet, we want to embrace the grass roots efforts of consumers to become more knowledgeable as to what options exist and make informed purchasing decisions that best support communication.

Keeping the holistic perspective of AAC is crucial. There is a real danger of succumbing to the media's interest in smaller, faster, more powerful devices, and ignoring the other features (customizability, learnability, durability, supports for training) that are critical to successful use of AAC. Our collective eagerness to use mobile devices is a good thing, as is capitalizing on consumer demand, widespread availability and low cost. We need more consumer input, especially to mass market companies who can feed a pipeline of new products. AAC professionals can help find ways to expand funding options. We can conduct research to address important questions, help develop improved Apps, provide customization when it is needed, and better integrate technology with real life situations. More informed consumers and professionals can only be good for individuals with CCN.

Conclusion

The AAC-RERC is committed to addressing the needs of persons with CCN. As an RERC we will follow the developments, concerns and issues outlined above. We may also participate in this zeitgeist through the creation of inventive Apps that we envision as being "out of the box." Our goal is to share information that will support thoughtful research and development. In addition to the research areas discussed above, as a field we need more evidence-based research of the cost-benefit of mobile devices, exploration of the global impact of mobile devices on AAC and continued focus on where mobile devices fit in the spectrum of AAC technology options. We will encourage dialogue through many forums so that stakeholders can stay abreast of what is clearly a rapidly changing landscape. As a field we have seen many positive developments in a short time. We would expect no less as ever newer technology affords even greater opportunities to persons with CCN and their communication partners.