
Using the iPad and a Sequence of Apps for Young Children with Multiple Disabilities

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Introduction

Tablet computers, and in particular the Apple iPad and its applications, have opened new doors for students with special needs. This has become evident from our observations of the many creative ways these devices are used both at home and in schools.

In the case of young children with multiple disabilities, this technology presents several challenges. An effective way to overcome these challenges and to increase the benefits of using tablets is to raise the awareness of the adults who work with these children. Strategies must then be developed to introduce these devices to children using a systematic approach.

The purpose of this article is to describe insights gleaned from the authors' experiences using the iPad as a tool for learning, engaging, and communicating with young children with multiple disabilities. The authors worked with children who were diagnosed as deaf-blind or deaf/ hard of hearing with cognitive disabilities and / or motor impairments. The areas of focus for this article will include (1) benefits of using the iPad; (2) challenges of using the iPad and solutions to these challenges; and (3) introducing the iPad to young children, with or without disabilities, using a sequential approach.

This article is appropriate for parents, educators, therapists, educational technologists and technical assistance providers. We will provide guidelines to assist them in educating students who have multiple disabilities, young children who are just starting to use the iPad, children for whom English is a second language, and children who require an informal assessment for a variety of reasons (e.g. children who don't have formal language due to deaf-blindness or deafness, and/or have emigrated from another country and have never been to school).

Traditional Computers Versus the iPad Tablet

While the traditional computer offers an attractive display, it requires the user to understand that the keyboard and mouse affect change on the screen. It also requires the user to sit at a workstation with little flexibility to suit his or her varying capabilities and needs. In addition, the traditional set-up offers limited opportunities for the user to easily customize programs to meet individual needs.

In contrast, the iPad offers several advantages:

- an interface that children can interact with directly,
- apps that more readily engage the child,
- options for customizing the screen on many of the apps,
- portability,
- ease of use, and
- interactive screen.

These attributes can enhance the activities and methods developed with the traditional computer, thereby making a tablet computer such as the iPad a more effective choice for many children with multiple disabilities.

Benefits of Using the iPad

We have identified six benefits of the iPad, which relate to how we interact with it in comparison to the traditional computer. These are: (1) intuitive use, (2) attractive and interactive surface, (3) light touch, (4) accessible features, (5) customization, and (6) regulation of input.

1. Intuitive Use

As stated above, traditional computers require the use of a mouse and keyboard to operate them, which makes their use less direct and more complicated than the iPad. In contrast, the gestures for interacting with the iPad are natural to humans. For example, touching something with a finger and/or hand; tapping on something and waiting for a response; and moving things up and down or side to side, all common gestures from daily living that transfer easily to the use of an iPad. As a result, children soon learn that when they touch the screen of an iPad something will happen. It is this difference in operation that makes the iPad intuitive to use.

2. Attractive and interactive large surface

The iPad offers children a large inviting surface where they can “play.” This attribute makes it useful not only for young children, but also for children with vision loss and /or motor impairment as it allows more space for interaction and larger icons. The visuals are colorful, have good contrast and size, and often move when touched, making for obvious interaction when the child touches it.

3. Light touch

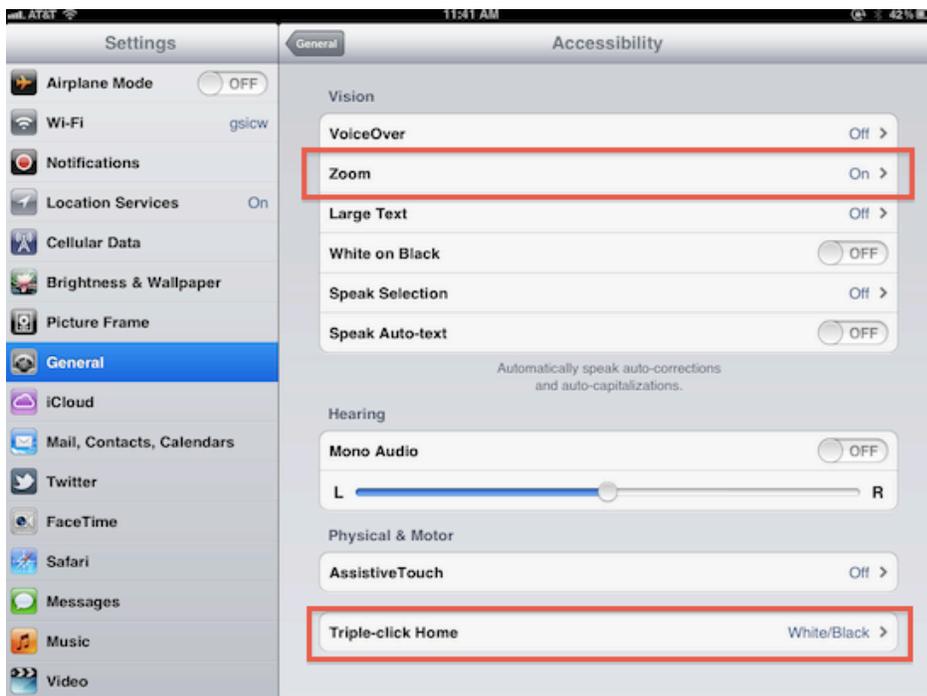
The iPad requires only a light touch. This may benefit young children who have not yet fully developed their fine motor skills, as well as those who have motor impairments. These physically challenged students don't need a lot of muscle strength to operate the iPad and get a response from it.

4. Accessible features

The iPad has accessibility features built into it, which can be found in the Settings app. We have included directions below.

To locate the accessibility features inside of Settings tap on "general," then "accessibility." The accessibility features include the following:

- *Voice over*: speaks text items on the screen;
- *Zoom*: magnifies a region of the screen;
- *Large text*: makes text larger in calendar, contacts, mail, messages and notes;
- *White on black*: changes the background to black on white, which means that the background is black and text is white for a higher contrast;
- *Speak selection*: changes the rate at which the speech is spoken;
- *AssistiveTouch*: allows someone who has difficulty touching the screen or controlling their hand movements to obtain the appropriate response from the app.



A final accessibility feature, found in Settings rather than Accessibility, is sound. The iPad can be set up for mono-aural listening for those who are deaf in one ear, and the general volume of the iPad can be regulated to suit the needs of people who are hard of hearing.

5. Customization

Many apps allow for customization by adding one's own pictures, content, and recorded voice to better correspond with a particular child's interest and abilities. For example, the "My A-Z" app [by Night & Day Studios, Inc.], allows one to substitute the drawing on the "cards" corresponding to each letter with photographs, voice and text. The child may find this arrangement more meaningful than that supplied by the developer.

The iPad itself can facilitate this important feature of customization as it has the capability of taking pictures, recording sound, writing and creating other types of content using the same iPad. This feature makes transferring customized content to the app quick and easy for the user.

It is important to consider the contrast and simplicity of the images you choose when selecting pictures for customization. The better the contrast and the fewer items in the picture, the easier it is for children to pick out what they need to pay attention to. For example, keep a picture of an apple simple with a plain background rather than an apple in a bowl. This will help children focus only on what you want them to focus on.

6. Regulation of level of input

Young children with multiple disabilities may become overwhelmed with sensory input and information. They tend to have more difficulty processing, comprehending and responding than typical children.

The use of an iPad by these children may enable them to regulate the level of input they receive because the device allows for more individual control. The child has an easier time accessing, engaging with and disengaging from, the iPad. One example of engagement and disengagement is when a child takes a break from an ebook or an app simply by looking away. This moment of looking away may help the child process and rest. Then, when ready, they can return to the e-book or app to find it exactly where they left off.

Therefore, it is the unique characteristics of the iPad that enable the child to regulate his or her level of input. These characteristics are the following:

1. The device is portable, so the child user can relate to it more intimately and personally.
2. The interface is intuitive and the child adopts easy-to-learn gestures which quickly become useful.
3. The device and many of the apps are designed with customization in mind, so that the child may respond better to the information that is on the screen.

4. The information on the screen does not change when the child disengages.
5. The child can bring his/her face as close to the iPad as necessary to regulate visual and auditory input.
6. The general settings of the iPad also allow for regulation of brightness, determination of speech rate, and selection of the optimum font size.

Challenges and Solutions

In the following section the authors describe a list of challenges and the solutions they have gleaned from their own and others' experiences. It is important to recognize that in the search for solutions the authors have encountered many who have been willing to share what they know as they, too, are on the path of searching for new alternatives for the students they serve.

The following five challenges will be addressed:

1. Glare on screen
2. Thinness and lightness of the iPad
3. Visual busyness of screen
4. Joint attention difficulties
5. Initial lack of interest

Challenge: Glare on screen due to the fact that the screen is made of reflective glass. As a result when light reflects directly on the screen the child may have difficulty discerning the difference between the glare and the content on the screen.

Solutions:

1. Use an antiglare matte screen cover.
2. Position the iPad, as best you can, so there is no direct light hitting the screen. Also consider re-arranging or adjusting the level of the light in the room when possible.

Challenge: The thinness and lightness of the iPad can adversely affect handling. While two of the advantages of the iPad are its thinness and lightness [which makes it portable], this can become an issue for children with limited motor control. Some children may not be able hold it in one hand and manipulate it with the other hand. Others may have difficulty controlling their hand movements and as a result may tend to knock over the iPad.

Solutions:

1. Hold onto the iPad for the child.
2. Guide and support the child from the wrist when their touch needs to be more refined
3. Use an easel with non-slip materials.

If you plan to use an easel, experiment with the angle to make it as easy as possible for the child to touch and see the screen. One easy way to do this is to use a three-inch three-ring binder. Place the iPad in the see-through sleeve on the outside of the notebook and observe how the child uses the iPad. This will let you gauge if that angle is appropriate. If you need to make an

adjustment, try different sizes of binders until you find the angle that works best for that child. Now you can make a sturdier, more permanent easel using the binder as a guide. Please see the link below for directions on how to make a simple and inexpensive easel much like the photo. <http://dhhitinerantforum.wordpress.com/wp-admin/post.php?post=105&action=edit&message=6&postpost=v2>).



Challenge: Visual busyness of the screen may make it difficult for the child to select desired icons.

Solutions:

1. Be aware of the number of icons you have on the screen. If possible have only a few icons. If that isn't possible consider re-arranging the icons on your screen or covering up a portion of the screen with a piece of paper to reduce the area the child has to look at.
2. Be aware of the contrast of pictures and text in relation to the background. In other words, try to avoid busy screen backgrounds that make it difficult to locate the appropriate icon.
3. Guide and support the child from the wrist to help them locate icons when necessary.

Challenge: Joint attention between child and adult may be hindered because (1) it may be difficult for children to divide their attention between the adult and the screen and /or (2) the attractiveness of the screen makes it difficult for children to pay attention to anything other than what is on the screen.

Solutions:

1. Place your face near the iPad so the child has an easier time of looking back and forth between the iPad and your face.
2. Use two iPads - this will create a shared activity.
3. Turn the activity with the iPad into a "turn-taking" game.
4. Be aware that tactile learners and young children may not consider the iPad as interactive as we may think in comparison to a toy that they can manipulate and play with (e.g. slinky). If you want face-to-face interaction, consider not using the iPad or use it as the last thing you do with the child in a given session of time.

Challenge: People may have the expectation that a child will enjoy the iPad or an app and if this does not happen they will stop using it. This, of course, will prevent the child from receiving the benefits of this technology.

Solutions:

1. Expose the child to the iPad and app on many occasions over time. This exposure should be consistent and within the child's routine. At the beginning it may be for short periods, perhaps seconds or minutes, and eventually it may increase as the child develops the ability to attend and learns to manipulate different apps.
2. Take an active role with the child while you are using an iPad. Your engagement may help the child to be engaged, too.
3. Search out and experiment with different apps and perhaps start with the simplest apps.

What follows is a sequential approach that will help guide you in finding the right apps for the children you work with as they progress in their ability to use the iPad.

Sequential Approach to Introducing the Apps to Young Children

In addition to considering the benefits, challenges and solutions when introducing an iPad to young children, the authors believe that a sequential approach to introducing the Apps may be critical too.

After observing how teachers and therapists were using iPads with children with multiple disabilities, the authors noticed that they tended to use cause-and-effect apps and /or apps that were visually busy, such as many of the learning games apps. Many service providers saw their students enjoy the cause and effect apps but not the learning games. As a result many of them felt that their students could not go beyond the cause and effect stage.

Concurrent to these observations the authors themselves worked with a variety of children with multiple disabilities using iPads. After trying different apps and different approaches, it became apparent that while many children would engage with the cause-and-effect apps, when presented with learning games as the next step, many children showed little interest.

The authors then began to consider how children progress from the cause and effect stage and how does one prepare a child to take an interest in learning games apps? After working with a variety of children in different contexts, it became apparent that a sequential approach, one that started with the least amount of input by the child and progressed to a more refined response, might mitigate both problems.

The following table is the sequence that the authors propose for introducing young children with or without disabilities to the iPad. This sequence can also be applied to older children who have multiple disabilities or who have had little or no exposure to schooling. The sequence correlates with some of the stages that we see in young children as they develop visual discrimination skills and visual attending skills, both pre-literacy skills. Therefore, we have included the corresponding developmental skills with each of the iPad sequence stages as a way to further explain that stage in the sequence.

iPad Sequence Step	What child does	Related Developmental Stages	Suggested apps
Elements of apps move on own or only change when touched.	Child only needs to look at screen. Child can choose to touch or not touch screen.	Early visual attending & tracking skills. It trains child to look at an iPad in meaningful way. Increases attention span.	Flash light (John Haney Software) Bright Star Baby: a bright start for smart babies (Eieio Software)
Cause & Effect: whole screen. No discrimination.	Child touches any place on screen to get a response.	Awareness that their actions create a response in environment / the iPad. Developing attending and visual tracking skills as they watch the responses on the screen.	Baby Finger (DJ International) Bubbles (Hog Bay Software) Fun Fireworks (Matthew Tomlinson) Fluidity HD (Nebulus Design) Fun Play Piano HD FREE (Victor Ren) Awesome (Tiny Mobile Inc.) Baby's Musical Hands (Streaming Colour Studios)
Cause & Effect: Discrimination required to touch specific areas. Learning that iPad presents pictures that can be interacted with	Child needs to touch specific spots on iPad to get a response.	More refined hand movements; more refined visual discrimination. Better eye hand coordination.	Pocket Pond (TriggerWave LLC) - areas to touch almost size of the screen. Peekaboo Barn (Night & Day Studios, Inc) - more discrete spots to touch, but not small. Fun Shooting Stars (Lewis Johnson) - larger area but stars present more discrete areas to touch.
Integrated scenes. Characters & objects relate to each other.	Child needs be able to take in a scene, maintain attention, touch discrete spots which respond & understand the relationship of parts of the scene to each other. Helpful for adults to work with child much the same as sitting with child with early books.	Increasing visual discrimination & attention span. Helpful for adults to point out things for child to look at and anticipate.	Itsy Bitsy Spider HD and Wheels on the Bus (Both by Duck Duck Moose)
Early Learning. Wide variety of apps for all sorts of skills and subjects.	Child works with adults to learn the specific skills necessary to interact with whatever app is being used.	At this point the child has developed their visual discrimination and attending skills such that they can touch discrete spots and take in more complicated screens while learning various concepts.	Zoo Train (Busy Bee Studios) Match It Up 1 (My First App) My A - Z (Night & Day Studios, Inc) Build-It-Up (My First App) All-in-One Big Trace Combo Free Lite (Brain Counts) Park Math (Duck Duck Moose)

There are a wide variety of early learning apps for all sorts of subjects and skills. The list above represents only a few of the learning apps that the authors have used successfully with young children. The problem for many adults is how to organize all of these apps so they can choose wisely. [See “Resources” at the end of this article for links to sites that have organized apps in several different ways.]

Three additional areas that may be useful for this population of children:

I. Dexterity and Problem Solving

Color Dots (by Ellie’s Games, LLC) - designed to develop visual tracking skills.

Imazing (by Fiendsoft) - creates mazes that start very simple and become quite complex.

Dexteria (by BinaryLabs) - designed to foster hand- eye coordination on the iPad

Fruit Ninja HD (by Halfbrick Studios) - a fun game that stimulates development of reflexes and hand - eye coordination.

2. Communication - two simple apps to start with when introducing young children to the idea of using the iPad as a communication device.

Verbal Victor (by Seed Stage Associates) - is organized by pages and not categories. It is easily customized by adults and only requires tap and swipe movements by the child.

Tap to Talk (by Assistyx LLC) - is organized by categories (sets and sub-sets). Note that “Lite” version cannot be customized, but the full version can be customized.

3. High contrast and high interest books. So far the authors have found only one storybook for young children that is high contrast with simple pictures, and is easy for a child to follow. It also has some interaction built into it. Developmentally it is similar to the cause and effect stage with the addition that the child realizes that this is a story being told.

Go Away Big Green Monster (by Night & Day Studios, Inc.)

Conclusion

The iPad offers many advantages to young children with multiple disabilities. It enables them to access the benefits of using a computer they would not otherwise be able to in a manner that is intuitive to use. Also, it has the ability to engage them almost instantly with its large surface, attractive graphics and apps, and its accessibility and customization capabilities.

As with any technology the iPad also brings challenges. Many of them can be mitigated with an awareness of these challenges and possible solutions as described in this article. Others require creative problem-solving based on understanding the strengths and needs of the child with whom this technology is being used, the goal for its use, and an understanding of the technology itself.

One way service providers, caregivers and other important adults in a child's life, can make good use of this tool is to present it to children in a way that is developmentally appropriate. The authors have presented a sequential approach to introducing young children with disabilities to the iPad. The goal of this approach is to allow these children to first become acquainted with the iPad before expecting them to do more complex tasks such as using learning apps. The authors have seen that different children progress through the sequence at different rates depending on age, degree of exposure to formal schooling, and type and severity of their disabilities.

This sequential approach has already enabled the authors to gather information regarding children's abilities, engage children who may have not become engaged, and offer useful advice to educators and parents about particular apps and the reasons behind these choices. Nevertheless, the information presented is anecdotal in nature. Therefore one of the next steps will be to conduct more systematic research to see if this approach will apply to a broader segment of the population of children and young people with multiple disabilities.

To date, the authors' experiences with children and young people with or without multiple disabilities has suggested a need for a wider variety of apps that can bridge the gap from simple cause-and-effect apps to apps that require higher order skills and abilities as do many of the learning apps. Perhaps the proposed sequence will prompt designers to fill this much-needed gap for young children with or without multiple disabilities.

Resources

- appswithaptitude.weebly.com
The author of this site reviews many apps based on high standards. The list is categorized and frequently updated.
- <http://www.perkins.org/resources/webinars/>
Archived Webinar by Perkins School for the Blind
"Appsolutely Engaging and Educational" presented by Eric Jerman
- <http://www.nationaldb.org/ISSelectTopics.php?topicCatID=853>
I Technologies (iPads, iPhones, iTouch)
- sites.google.com/site/iste2012ipadworkshop/home.
This site lists apps by categories mainly designed for elementary classrooms. The site was built for a presentation given to the International Society of Technology in Education (ISTE).
- <http://www.usdb.org/deafblind/db/IPad%20App%20Information/Forms/AllItems.aspx>
Utah School for the Deaf & the Blind iPad App Information